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ENTERIC FEVER DUE TO BACTERIUM ENTERITIDIS VAR. BLEGDAM (SALMONELLA BLEGDAM): A SERIES OF FIFTY CASES IN AUSTRALIAN SOLDIERS FROM NEW GUINEA.

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AND
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A NUMBER of cases of enteric fever have been diagnosed in Australian army medical units since military operations began in New Guinea in 1942. A few were caused by *Bacterium typhosum*, *Bacterium paratyphosum A* or *Bacterium paratyphosum B*, but the majority were infections with *Bacterium enteritidis*. Strains isolated in twenty-three of these cases were further investigated at the Institute of Medical and Veterinary Science, Adelaide, and all were found to be *Bacterium enteritidis* var. *blegdam*.

The cases here described were dealt with at a number of Australian army medical units, the only series of any size comprising the patients infected in a small outbreak which occurred in an infantry brigade at Buna early in 1943. One of us (A.V.J.) was pathologist at the Australian general hospital where these patients were treated, and undertook a detailed study of the clinical pathology. The organisms isolated from these fourteen cases were identical as far as could be determined in a field laboratory. Two of the strains (from Cases XXIX and XXX) were sent to Miss Nancy Atkinson, Institute of Medical and Veterinary Science, Adelaide, for antigenic analysis, and both were identified as *Bacterium enteritidis* var. *blegdam*.

Atkinson[1] has prepared a preliminary report on the strains of *Bacterium enteritidis* var. *blegdam* isolated in the cases described in this paper.

Definition.

Bacterium enteritidis var. *blegdam* can cause in man a severe disease, which in the absence of complications lasts about three weeks and is characterized by fever of a fortnight's duration, by toxæmia, by a relatively slow pulse rate, by abdominal distension, and by diarrhœa. Localization of infection in the urinary bladder, bones, lungs, and serous cavities is frequent, however, and may prolong the fever for many weeks. Bacteriæmia is probably invariably present in the early stages, and after the first week the organism can often be found in the fæces and urine.

Rarely the infection may cause recurrent diarrhœa or dysentery, without evidence of blood-stream invasion, and the organism has been recovered from a healthy native labourer (Case N I) during a rectal swab survey of a native labour camp at Port Moresby.

Geographical Distribution.

The first cases recognized occurred among soldiers who had been fighting in the Owen Stanley Ranges in New Guinea at the end of 1942. Early in the next year a number of cases occurred among troops fighting in the Buna area. The next small outbreak was associated with the Huon Peninsula campaign a year later.

Sporadic cases have occurred in various parts of New Guinea, including Milne Bay, Salamaua, Lae, the Ramu Valley, Madang and Aitape, and on Bougainville Island.

Eight of the cases described in this paper were diagnosed in Australia, but all the patients had recently returned from New Guinea. Apart from these cases, *Bacterium enteritidis* var. *blegdam* has never been discovered in the thousands of cultural examinations of human stools carried out in military hospitals on the Australian mainland during the last five years.

Bacterium enteritidis var. *blegdam* has been isolated from natives in the Moresby, Dobodura and Finschhafen areas of New Guinea, and on Bougainville Island. Clinical records are scanty; but in natives the disease appears to run a course similar to that seen in Europeans.

Since August, 1943, the Japanese have reported the frequent occurrence of enteric fever due to "Gärtner's bacillus" in New Britain, New Guinea and the Solomon Islands. *Bacterium enteritidis* var. *blegdam* was isolated from the blood of a Japanese prisoner of war who was captured in the final stages of the Buna campaign. He was suffering from a typhoid-like fever and subsequently died, but no post-mortem examination was carried out.

In September, 1944, Captain E. French[2] isolated *Bacterium enteritidis* var. *blegdam* from mice and guinea-pigs in a spontaneous epidemic in the animal house of the Base Military Hospital, Melbourne, Victoria. The organism had not been isolated previously from either human patients or laboratory animals at this hospital.

Epidemiology.

The epidemiology of the cases of enteric fever described in this paper has not been carefully studied. The highest incidence was in infantry troops fighting in the coastal jungles of Buna and the Huon Peninsula; but a few cases have occurred among soldiers living in static units in which sanitary arrangements were comparatively good.

Thirteen soldiers belonging to different units of one Australian infantry brigade were evacuated to hospital with enteric fever due to *Bacterium enteritidis* var. *blegdam* between January 26 and February 18, 1943. Questioning of these soldiers revealed that about a fortnight before the onset each of them had passed through the staging camp at Soputa.

A few patients were infected at Port Moresby while waiting to be returned to Australia after the end of the Papuan campaign. It is possible that the source of infection in these cases was an unrecognized carrier from the Soputa outbreak.

Prior to the war, detailed bacteriological investigations were carried out in comparatively few cases of sickness in New Guinea natives. Lieutenant-Colonel C. Backhouse,[3] who was for about fifteen years Medical Officer in Charge of the Government Health Laboratory at Rabaul, said that to his knowledge *Bacterium enteritidis* had never been isolated from the blood or fæces of any patients, European or native, prior to the war. However, since 1943 several cases of infection with *Bacterium enteritidis* var. *blegdam* have been diagnosed among the small number of natives admitted to Australian general hospitals in various parts of New Guinea or the Solomon Islands.

The causative organism is excreted in large numbers and for a considerable period in both the fæces and the urine in overt cases. Cross-infection has occurred in hospital wards, owing to failure to recognize the disease early and institute strict isolation. Patients with recurrent diarrhœa (for example, Cases I and XLII) may be ambulant and excrete the organism in the fæces for a long time.

The isolation of *Bacterium enteritidis* var. *blegdam* from macroscopically normal stools during and after convalescence indicates that convalescent and healthy carriers may also be sources of infection. *Bacterium enteritidis* var. *blegdam* was isolated from a healthy Papuan native (N I) during a rectal swab survey of a native labour camp at Port Moresby.

Captain E. French[2] has supplied the following information on an outbreak of *Bacterium enteritidis* var. *blegdam* infections among laboratory animals at the Base Military Hospital in Melbourne, Victoria.

> In September, 1944, an epidemic disease appeared spontaneously amongst the laboratory mice. It affected mice of all ages and both sexes, and the overall mortality in infected cages was about ninety per cent. All post-mortem cultures from the heart blood, spleen, and liver of mice found dead, and of moribund animals killed with chloroform, yielded pure cultures of *Bacterium enteritidis* var. *blegdam*. The epidemic had been maintained by the caging together of young mice from infected and uninfected cages. Segregation of mice from the infected cages was followed by the rapid disappearance of the disease. It is not known whether infections again became apparent when strict segregation ceased.
>
> As the epidemic in the mice waned cases appeared amongst guinea-pigs housed in an adjacent room. The overall mortality in guinea-pigs was about twenty per cent. Post-mortem cultures of the heart blood yielded a pure growth of *Bacterium enteritidis* var. *blegdam*. The epidemic ceased spontaneously without segregation of the guinea-pigs.

Rats and mice abound in most military camps in New Guinea; but no investigations have been carried out to see whether they may be carriers of *Bacterium enteritidis* var. *blegdam*.

It seems probable that the human carrier is the most important source of infection, and it is possible that contamination of food by the excreta of rodents may cause sporadic cases.

Pathology.

Five deaths due to *Bacterium enteritidis* var. *blegdam* are known to have occurred; three of the subjects were Australian soldiers, one was a Solomon Islands native, and one was a Japanese prisoner of war.

Only one brief post-mortem report is available. The clinical history of this case is described later in this paper (Case XXXVIII), and Figure I shows the temperature chart. The significant pathological changes were as follows. The cardio-vascular system was normal, except for slight atheroma in the ascending aorta and the orifice of the left coronary artery. In the respiratory system the trachea and bronchi were congested. There was almost complete consolidation of the basal lobes of both lungs, with early bronchopneumonic consolidation in the upper lobes. The liver was moderately enlarged, firm and congested. The spleen was enlarged, congested and friable. The urogenital system was normal, except for slight swelling and congestion of both kidneys. In the gastro-intestinal tract, examination of the lower part of the ileum revealed considerable swelling and congestion of Peyer's patches, but no ulceration. The mucosa was normal except for slight congestion in the distal nine inches. In the mucosa of the caecum and the ascending colon moderate congestion was present, and in that of the lower part of the colon and the rectum, slight congestion. The lymphoid follicles of the caecum and the ascending colon were swollen and inflamed.

Unfortunately, no bacteriological examination of post-mortem material was carried out, and although sections were prepared from a number of organs, they have been lost, and no description of the histological changes is available.

Case Records.

The significant features of the fifty cases among Australian soldiers described in this paper are shown in Table I. The cases are grouped into three categories: simple diarrhœa (Case I); salmonella fever without complications (Cases II to XXIII); and salmonella fever with septic complications (Cases XXIV to L). Cases among New Guinea natives are not included in Table I.

Symptomatology.

Three clinical types of salmonella infection are commonly recognized in man:[4] salmonella gastro-enteritis, salmonella fever, and a septicæmic form in which localization of infection occurs (the "septico-pyæmic" form).

Salmonella Gastro-Enteritis.—Salmonella gastro-enteritis is the well-known "salmonella food-poisoning" syndrome, with a short incubation period, abrupt onset, abdominal pain, vomiting and diarrhœa. None of the cases of our series conformed with this description. Diarrhœa was the only symptom in one case.

The patient in Case I had suffered from recurrent diarrhœa for six weeks before his admission to hospital. Several courses of sulphaguanidine had been given at the regimental aid post but had failed to control the diarrhœa. The stools consisted of liquid fæces with a few flecks of mucus. Sigmoidoscopic examination revealed hyperæmia, but no ulceration of the mucous membrane. *Bacterium enteri-*

TABLE I.
Details of Investigations on Fifty Cases in Australian Soldiers.

TABLE I.

Details of Investigations on Fifty Cases in Australian Soldiers.[1]

Case Number.	Date of Onset.	Days of Fever.	Cultural Investigations.									Leucocytes per Cubic Millimetre.		Agglutinations with *Bacterium Enteritidis* Var. *Bleqdam.*		Malaria Parasites.		Complications.		Remarks.
			Blood.		Fæces.		Urine.		Other Material.											
			Day	Result.	Day	Result.	Day	Result.	Material.	Day	Result.	Day	Result.	Day	Result.	Day	Result.	Week.	Type.	
I	17. 1.44	0			2	+P	2	−N				6	5,600	22	1/500					Recurrent diarrhœa for six weeks.
					14	−N	24	−N												
					24	−N														
II	13. 1.43	19	8	−	8	+P	8	−N				10	16,000			24	*P.v.*			
			19	−	12	+P	15	−N				34	6,800							
					17	−P														
					31	−P														
III	3. 2.43	9			29	+P										7	*P.f.*			
					49	+P														
					55	N														
IV	5. 2.43	20	7	+	14	−								41	1/25					
					22	−	22	−N												
					32	−	32	−N												
V	9. 2.43	33	9	+	18	+P	28	+N												Rose spots on abdomen on fifteenth day.
					33	+P	35	−												
							41	−				20	4,250	37	1/25					
VI	18. 2.43	15	11	−	8	+	8	−				14	10,400	24	1/500					
VII	22. 3.43	12	8	−	8	+P (*a*)[2]	5	N								2	*P.v.*			(*a*) Confirmed *bleqdam.*
			13	−	12	−P	11	−N												
					19	+N	15	−N												
VIII	24. 3.43	12	10	+ (*a*)	10	−N	10	−N								4	*P.v.*			(*a*) Confirmed *bleqdam.*
			17	−	16	−N	18	−N												
					17	−N														
					19	−N														
					24	−N														
IX	8.10.43	9			8	+P										3	*P.f.*			
					10	+P														
					12	N														
X	14.10.43	5	3	+ (*a*)	3	−P	3	−N				4	9,500			−2	*P.f.*			(*a*) Confirmed *bleqdam.*
					8	−P	10	−N				21	9,500							
					11	−P	12	−N												
					12	+P (*a*)	23	−N												
					13	+P	29	−N												
					23	−N	34	−N												
					27	−N	64	−N												
					30	+N														
					44	+N														
					53	−N														
					57	−N														
					61	−N														
XI	14.10.43	34			16	+P	14	−N				16	8,400							
					46	−N	39	−N												
					49	−N														
					56	−N														
					61	−N														
XII	26.10.43	18	14	+ (*a*)	33	−P			Wound.	16	− (*b*)[2]	8	10,000			2	*P.v.*			Admitted to hospital with severe compound fracture of right tibia, which became infected. Three weeks after injury developed salmonella fever. (*a*) Confirmed *bleqdam*; (*b*) *Proteus vulgaris* and *Pseudomonas pyocyanea* grown.
									Swab.	29	−	14	12,500							
												17	15,000							
XIII	24.12.43	13	12	+ (*a*)	18	−	18	−								8	*P.v.*			(*a*) Confirmed *bleqdam.*
					28	−P	34	−												
					34	−						11	3,400	45	1/250					
												15	4,100							
												30	4,500							

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TABLE I.—*Continued.*
Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

Case Number.	Date of Onset.	Days of Fever.	Cultural Investigations.									Leucocytes per Cubic Millimetre.		Agglutinations with *Bacterium Enteritidis* Var. *Bleqdam*.		Malaria Parasites.		Complications.		Remarks.
			Blood.		Fæces.		Urine.		Other Material.											
			Day	Result.	Day	Result.	Day	Result.	Material.	Day	Result.	Day	Result.	Day	Result.	Day	Result.	Week.	Type.	
XIV	26.12.43	14	12	−	12	−P	26	−				15	6,800	44	1/250	4	*P.v.*			
					23	+N						26	6,000			13	*P.f.*			
					31	−						36	8,700							
XV	6. 1.44	6			7	−P	39	−N												
					13	+N	44	−N				14	6,400	32	1/25	4	*P.f.*			
					21	+N														
					34	−														
					39	−														
					44	−														
XVI	6. 1.44	12	11	+	7	+P	11	−				14	6,400	32	1/250	37	*P.v.*			
		then low fever to 99° F. for several days.			12	+	37	−												
					24	+	56	−												
					37	+	58	−												
					43	+	62	−												
					56	−	67	−												
					58	−														
					62	−														
					67	−														
XVII	8. 1.44	16	11	+	12	−N	7	N				4	2,300							Erythematous rash on trunk on first day, becoming macular on second day and purpuric on elbows and groin on fourth day.
							9	−				9	4,000							
							11	−												
XVIII	9. 1.44	15	5	+	11	−	9	−				4	2,700	29	1/250	5	*P.f.*			
					22	−	31	N												
					24	−														
					25	−														
					30	−														
XIX	21. 1.44	13			8	+P (*a*)[2]	27	−N								−11	*P.f.*			Rash on fifth day—similar to that of dengue fever. (*a*) Confirmed *bleqdam*.
					17	−N	29	−N												
					19	−N	31	−N												
					20	−N														
					27	−N														
					29	−N														
					31	−N														
XX	23. 4.44	8	1	−	6	−P	2	−N				2	15,000							Admitted to hospital eight days earlier with dermatitis due to quinine sensitivity. Quinine given intravenously on second day of salmonella fever caused acute exfoliative dermatitis.
			6	+	26	−N	8	−N				6	9,000							
							9	−N												
							14	−N												
XXI	28. 4.44	10	8	+	11	−N	11	−N				8	10,000							
XXII	2. 5.44	12	9	+			10	N				8	8,300							
							12	−N												
XXIII	24. 3.45	7	7	+ (*a*)	7	−N	6	−N				5	4,000			−2	*P.v.*			(*a*) Confirmed *bleqdam*.
					15	−N	15	−N												
					21	−N	21	−N												
XXIV	17.12.42	9	6	+	6	+P	6	−				6	7,400			3	*P.v.*	Second (6th day), (9th day).	Bilateral bronchopneumonia. Death.	Rose spots on abdomen, trunk and limbs on sixth day.
XXV	7. 1.43	12	8	+ (*a*)	8	+P (*a*)	12	+P				8	7,400			5	*P.v.*	Second.	Cystitis (*b*).	(*a*) Confirmed *bleqdam*.
					16	+N	16	P				60	9,600							(*b*) Brisk hæmaturia lasting for two days was the first sign of bladder involvement.
					44	−N	23	P												
					60	−N	31	+P												
							37	+P												
							44	−N												
							60	−N												

[1] All cultural examinations: "+" = *Bacterium enteritidis* isolated; "−" = *Bacterium enteritidis* not isolated. Fæces: "N" = stool normal macroscopically and microscopically; "P" = stool abnormal macroscopically and microscopically. Urine: "N" = urine microscopically normal; "P" = urine contained abnormal cellular deposit; when neither N nor P is indicated, no data were available. Malaria parasites: "*P.v.*" = *Plasmodium vivax*; "*P.f.*" = *Plasmodium falciparum*.
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TABLE I.—*Continued.*
Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

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Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

Case Number.	Date of Onset.	Days of Fever.	Cultural Investigations.									Leucocytes per Cubic Millimetre.		Agglutinations with *Bacterium Enteritidis* Var. *Bliegdam.*		Malaria Parasites.		Complications.		Remarks.
			Blood.		Fæces.		Urine.		Other Material.									Week.	Type.	
			Day	Result.	Day	Result.	Day	Result.	Material.	Day	Result.	Day	Result.	Day	Result.	Day	Result.			
XXVI	20. 1.43	45	33	—					Pleural fluid.	27 40	+ (*a*)[2] +							Fourth.	Empyema.	Penetrating gunshot wound, left side of chest. Unexplained fever after fourth day, then hæmopneumothorax, then empyema. (*a*) Semi-purulent fluid growing pure culture of *Bacterium enteritidis*.
XXVII	26.1.43	43	40	—	42 71 80 96	−N −N −N −N	26 40 42 55 68 77	P +P +P −N −N −N						51	1/1000	9	*P.v.*	Second. Third. Fourth. Fifth.	Periostitis, left ulna (*a*). Left epididymo-orchitis. Cystitis (*b*). Right epididymo-orchitis.	(*a*) X-ray examination during third and sixth weeks, no abnormality. (*b*) First sign of cystitis was hæmaturia, which lasted two days.
XXVIII	28. 1.43	30	26	—	12 13 118	+P +P(*a*) −N	13 24	P −N				22 39	5,000 8,000			8	*P.v.*	Second.	Cystitis.	(*a*) *Bacterium dysenteriæ* Flexner also isolated from stool.
XXIX	1. 2.43	26	8 22	+ (*a*) —	26 36	— + (*a*)	14 18 21 49	+P (*a*) +P +P —				15	16,550	41	1/250	40	*P.v.*	Second. Third.	Periostitis, left humerus. Cystitis (*b*) and right epididymo-orchitis.	(*a*) Confirmed *bliegdam*. (*b*) First sign of cystitis was hæmaturia.
XXX	1. 2.43		11 40	+ (*a*) —	9 26 36 72	−P −N −N −N	9 26 36 72	−N −N −N −N	Pleural fluid. Sputum.	36 48 40	− (*b*) − −	22	9,050	41	1/1000	5	*P.v.*	Fourth. Fourth.	Bronchopneumonia. Pleural effusion.	(*a*) Confirmed *bliegdam*; emulsion used for agglutination reactions. (*b*) Pleural fluid was clear, straw-coloured and sterile.
XXXI	2. 2.43	56	32	—	32 34	−N −N	31 32 57	+P +P −						43	1/500	28	*P.v.*	Second. Second. Second. Sixth.	Periostitis, left acromion. Bronchopneumonia. Cystitis. Perichondritis, left costal cartilages.	Faint rash on abdomen on twelfth day.
XXXII	3. 2.43	65	22	—	34 48	— +	65	—	Pleural fluid. Pleural fluid. Pleural fluid. Sputum.	30 33 46 57 46	+ (*a*) + + + + (*b*)	26 32	7,950 12,000	39	1/1000	2	*P.v.*	Second. Third.	Bronchopneumonia. Empyema, left lung.	(*a*) Pleural fluid was purulent and gave a pure growth of *Bacterium enteritidis*. (*b*) *Bacterium enteritidis* isolated from sputum.
XXXIII	4. 2.43	6	19	—	23 31 38 46	+ + + —	13 18 25 29 46	+P +P − − −N				12	10,900	42	1/500			Second.	Cystitis, right brachial arteritis.	
XXXIV	5. 2.43	24	7 20	+ +	22	+	20 40 51 61 70 86 150	+P +P +P +P +P − +P (*a*)				18	3,900	41	1/500			Third.	Cystitis.	Rose spots on seventh day. Persistent cystitis treated with sulphadiazine. After one week's treatment urine was clear and sterile, but later relapsed and culture was obtained five months later. (*a*) Cultures obtained from bladder and left kidney.

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TABLE I.—*Continued.*
Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

Case Number.	Date of Onset.	Days of Fever.	Cultural Investigations.									Leucocytes per Cubic Millimetre.		Agglutinations with *Bacterium Enteritidis* Var. *Bleydam.*		Malaria Parasites.		Complications.		Remarks.
			Blood.		Fæces.		Urine.		Other Material.											
			Day	Result.	Day	Result.	Day	Result.	Material.	Day	Result.	Day	Result.	Day	Result.	Day	Result.	Week.	Type.	
XXXV	16. 2.43	70	46	−	46	−	43 59 75	+P +P −						44	1/1000			Fourth	Cystitis and epididymo-orchitis.	Cystitis treated with sulphadiazine. After one week's treatment the urine was clear and sterile.
XXXVI	17. 2.43	21	9	+	20	−	20 22 37 47	+P +P − −				9 13	4,000 10,700	28	1/500	2	*P.v.*	Third.	Cystitis.	
XXXVII	28. 3.43	22	10	+	10	+	10	+	Pus from buttock abscess.	19	+ (*a*)[2]	8 14	1,300 5,400	38	1/2500	3	*P.v.*	Second. Third.	Cystitis Abscess of buttock	(*a*) Patient bruised buttock whilst delirious. Later a large deep abscess developed in this site. Pus from it gave a pure growth of *Bacterium enteritidis*.
XXXVIII	19. 3.43	13	9	+ (*a*)	9	+P (*a*)	10 12	−P +P (*a*)	Sputum (*b*).	12	No streptococci or pneumococci.					5	*P.v.*	Second (10th day). (12th day). (13th day).	Cystitis. Bronchopneumonia. Death.	(*a*) Confirmed *bleydam*. (*b*) Sputum not examined for *Bacterium enteritidis*.
XXXIX	13. 9.43	10 (*a*)	28	−	29 38 63 71 93 94 110 118 128 168 174 177 208	+N (*b*) +P +N +N +N +N +N −N +P (*c*) −N +N +N +N	45 63 71	N −N −N	Bile from duodenum.	75 249	− + (*b*)	25 31 39 93	5,000 13,800 9,800 7,600			116	*P.v.*	Third and recurrent. Fifth.	Cholecystitis. Left orchitis.	(*a*) After one week without fever it recurred for three weeks. (*b*) Confirmed *bleydam*. (*c*) Vegetative forms of *Entamœba histolytica* present.
XL	26. 9.43	36	21 37	− −	18 32 46 52 59 71 79 81 85	+P +N +N +N +N +N −N −N −N	14 16 17 18 21 24 26 32 47 71 79	N P P P +P N −N +N −N −N −N	Bile from duodenum.	65	−	15 37	12,700 10,000	26 37	1/320 1/1280	10	*P.f.*	Third	Cystitis.	
XLI	15.11.43	17			6 23 36 40 78 96	+P (*a*) +N −N +N −N −N	23	−N				16	7,500			−4	*P.f.*	Third.	Left epididymo-orchitis.	Admitted to hospital with hepatitis. *Plasmodium falciparum* in blood film. Salmonella fever commenced ten days after onset of hepatitis. (*a*) Confirmed *bleydam*.
XLII	29.12.43	18			240 300 320 340 365 372 379	+P (*a*) +P (*b*) + + − − −			Pus from gall-bladder Bile from gall-bladder. Wound infection.	14 358 365	Smear: Gram-negative rods. + (*b*) +					8	*P.f.*	Second.	Empyema of gall-bladder.	(*a*) Days approximate; see text for full description of this case. (*b*) Confirmed *bleydam*.

[1] All cultural examinations: "+" = *Bacterium enteritidis* isolated; "−" = *Bacterium enteritidis* not isolated. Fæces: "N" = stool normal macroscopically and microscopically; "P" = stool abnormal macroscopically and microscopically. Urine: "N" = urine microscopically normal; "P" = urine contained abnormal cellular deposit; when neither N nor P is indicated, no data were available. Malaria parasites: "*P.v.*" = *Plasmodium vivax*; "*P.f.*" = *Plasmodium falciparum*.
[2] The letters (*a*), (*b*), (*c*), (*d*), (*e*) refer to the corresponding entries in the "Remarks" column of this table.

TABLE I.—*Continued.*
Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

[1] The letters (a), (b), (c), (d), (e) refer to the corresponding entries in the "Remarks" column of this table.

TABLE I.—*Continued.*

Details of Investigations on Fifty Cases in Australian Soldiers.[1]—Continued.

Case Number.	Date of Onset.	Days of Fever.	Cultural Investigations.									Leucocytes per Cubic Millimetre.		Agglutinations with *Bacterium Enteritidis* Var. *Bleqdam.*		Malaria Parasites.		Complications.		Remarks.
			Blood.		Fæces.		Urine.		Other Material.									Week.	Type.	
			Day	Result.	Day	Result.	Day	Result.	Material.	Day	Result.	Day	Result.	Day	Result.	Day	Result.			
XLIII	28. 2.43	5 (a)[2]			1	P	18	+P (b)						7	1/40	3	*P.v.*	Third.	Cystitis.	(a) Recurrence of fever with cystitis in fourth week. (b) Confirmed *bleqdam.*
					3	+P (b)	26	P						38	1/160					
							32	P												
XLIV	29.12.43	16			8	P	31	−N				11	3,300					Second.	Bronchopneumonia.	(a) Clinical notes incomplete, laboratory facilities inadequate early in illness.
					13	P	34	+P										?	Cystitis (a).	
					14	+P	48	−N												
					34	−N	55	−N												
					41	−N														
					48	−N														
					55	−N														
XLV	9. 1.44	9 (a)	5	+ (b)	4	P	12	−N				4	6,400	32	1/1250	−6	*P.f.*	Third.	Cystitis.	(a) Recurrence of fever with onset of cystitis. (b) Confirmed *bleqdam.*
					12	+ (b)	19	+P (b)				13	9,200					Third.	Right epididymo-orchitis.	
					28	+	28	−												
					36	+	36	−												
					38	+	38	−												
					70	−	60	−												
					76	−														
XLVI	17. 1.44	19			12	+N	11	P				10	10,700					Second.	Cystitis	Admitted to hospital with jaundice and fever.
					24	−N	13	+P												
					36	−N	24	+P												
					45	−N	33	−N												
					48	−N	36	−N												
							45	−N												
							48	−N												
XLVII	27. 2.44	21	6.	+	8	+P	6	N				8	5,300			1	*P.f.*	Second.	Cystitis.	
					11	+N	8	P												
					25	+N	9	+P												
					34	+N	25	+P												
					40	+P	33	−N												
					53	−N	51	−N												
					56	−N	54	−N												
					58	−N	56	−N												
							58	−N												
XLVIII	31. 3.44	25	9	+	12	+P	8	P	Sputum.	60	Pneumococci.	10	2,000			8	*P.f.*	Second.	Cystitis.	(a) Pneumococcal bronchopneumonia contracted during convalescence.
			57	−	20	−	9	P				74	10,000					Ninth.	Bronchopneumonia (a)	
					25	−N	10	P				78	7,000							
					37	−N	12	+P												
					41	−N	18	N												
					43	−N	27	+P												
					47	+N	29	+P												
							31	−												
							39	+P												
							41	−N												
							45	−N												
							55	−N												
							74	−N												
XLIX	10. 9.44	Initial	58	+ (b)	39	−P						21	4,500					Eighth.	Pneumonia.	(a) Admitted to hospital with jaundice and fever. Exact time of commencement of salmonella fever hard to determine. (b) Confirmed *bleqdam.* (c) Clear, straw-coloured fluid. (d) Purulent fluid under pressure. (e) Faintly turbid. *Pseudomonas pyocyanea* and *Bacterium coli* present.
		27 (a)	75	−	54	−P			Sputum.	80	−	48	4,100					Ninth.	Pericarditis.	
		Afebrile			56	−N			Pleural	94	− (c)	56	3,200					Twelfth.	Pleural effusion.	
		16			58	−N			fluid.	98	− (c)	58	8,100							
		Febrile			60	−N			Pericardial	96	+ (b)	60	4,200							
		4			188	−N			fluid.		(d)	82	7,500							
		Afebrile								108	−	84	10,700							
		11									(e)	89	12,200							
		Febrile							Wound	124	−	95	15.500							
		56							swab.			102	11,200							
												112	7,800							
												114	7,800							
												186	12,600							
L	26.12.44	28	10	+	26	−N	23	−N				5	5,200					Second.	Periostitis in region of left sacro-iliac joint.	
					27	−N	29	−N				17	17,800							
												31	10,000							

[1] All cultural examinations: "+" = *Bacterium enteritidis* isolated; "−" = *Bacterium enteritidis* not isolated. Fæces: "N" = stool normal macroscopically and microscopically; "P" = stool abnormal macroscopically and microscopically. Urine: "N" = urine microscopically normal; "P" = urine contained abnormal cellular deposit; when neither N nor P is indicated, no data were available. Malaria parasites: "*P.v.*" = *Plasmodium vivax*; "*P.f.*" = *Plasmodium falciparum.*

[2] The letters (a), (b), (c), (d), (e) refer to the corresponding entries in the "Remarks" column of this table.

tidis was isolated from the fæces. After a fortnight's rest in bed and a course of sulphamerazine, the diarrhœa ceased and attempted culture of the fæces failed to grow any pathogenic organisms. The patient's serum agglutinated to a dilution of 1/500 a formolized emulsion of *Bacterium enteritidis* var. *blegdam*.

On Bougainville Island *Bacterium enteritidis* var. *blegdam* was isolated from the fæces of a native child, aged two years (Case N II), who suffered from two attacks of dysentery and fever, each lasting for about three days, at an interval of two weeks.

Salmonella Fever.—Salmonella fever resembles typhoid fever; pyrexia, malaise, leucopenia and a relatively slow pulse rate are present. Of the 50 cases of this series, 22 conformed with this syndrome. The following composite case history is representative. The infected soldier reports to the regimental aid post with a history of headache, malaise, anorexia, insomnia, aches and pains, and occasional shivers for two or three days. The onset and development of these symptoms are gradual. Examination reveals that the man is obviously ill, with a temperature of 102° to 103° F. and a relatively slow pulse rate. The face is flushed, the skin moist and the tongue heavily furred. No enlargement of the lymphatic glands can be detected, but the spleen may be palpable. Examination of the blood for malarial parasites gives negative results. During the next few days the fever continues unabated, and signs of toxæmia become more evident. The leucocyte count reveals a neutrophile leucopenia, and *Bacterium enteritidis* can be grown on culture from the blood. Early in the second week the abdomen becomes distended and tender, and diarrhœa occurs, the stools consisting of liquid fæces with a little mucus. *Bacterium enteritidis* can be isolated from these stools. At the end of the second week the patient's condition improves, diarrhœa ceases and the temperature falls by lysis. Convalescence is uneventful, but *Bacterium enteritidis* can be grown on culture from apparently normal stools for a further three weeks. In the two fatal cases among Australian soldiers more severe manifestations of salmonella fever were present, characterized by great toxæmia and rapid march of symptoms. Neither patient lived long enough for complications to become apparent, but in both of them bronchopneumonia occurred, and was probably caused by *Bacterium enteritidis*.

In Case XXIV the patient was engaged in fighting in the Owen Stanley Ranges. He contracted scrub typhus early in November, 1942, and had suffered from persistent diarrhœa for seven weeks prior to evacuation to Australia on December 14, 1942. He was ill on board ship and was admitted to hospital on his arrival in Australia, with a history of headache and rigors for the past three days. On admission to hospital he was obviously ill; the spleen was enlarged and tender and the tongue was heavily furred. Examination of a blood film revealed numerous trophozoites of *Plasmodium vivax*. Intensive antimalarial therapy had no effect on the fever or toxæmia, both of which increased in severity. The temperature rose to 106·8° F., the abdomen became tender and distended, and the bowels acted freely. On the sixth day of the disease examination of blood films revealed no malaria parasites, but cultures of blood and fæces yielded *Bacterium enteritidis*. Rose-pink spots appeared on the abdomen and the right foot at this stage. The rash later became extensive, the individual macules becoming confluent in some areas. The respiration rate increased and signs of patchy consolidation were present in both lungs. The patient became comatose and died on the ninth day of the disease.

The patient in Case XXXVIII was admitted to hospital in Australia ten days after leaving New Guinea, with a history of headache and fever of three days' duration. Moderate numbers of trophozoites of *Plasmodium vivax* were found in a thick blood film, but the fever did not respond to routine antimalarial therapy. His clinical condition rapidly deteriated, he became stuporose, the abdomen became distended and tender, and 12 fluid motions were passed. Culture from blood and fæces yielded *Bacterium enteritidis* var. *blegdam*, and the same organism was later obtained from the urine. Signs of bilateral pulmonary consolidation were found on the eighth day and death occurred on the thirteenth day.

The temperature chart of this patient, with pulse rate and respiratory rate, is shown in Figure I, and a brief autopsy report is given in the section "Pathology". There was a history of syphilitic infection and the Kline precipitation test yielded a positive result.

Two cases of uncomplicated salmonella fever have been seen among New Guinea natives (Cases N III and N IV).

Septicæmic Type with Localization of Infection.—In the septicæmic type with localization of infection, the organism spreads through the blood stream and becomes localized in various parts of the body. Twenty-seven cases fall into this category. During the first two weeks the course of the illness resembled salmonella fever, but from that stage

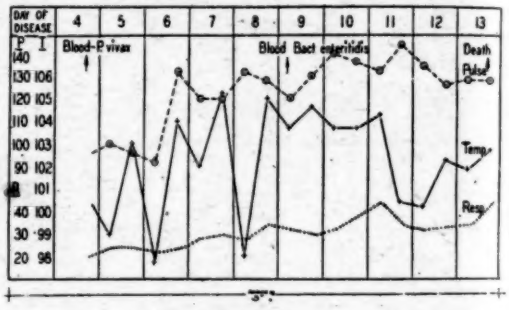

FIGURE I.
Temperature chart in Case XXXVIII, a severe infection ending fatally on the thirteenth day.

onwards various local septic complications became evident, and fever was usually greatly prolonged. The commonest complication was cystitis. Periostitis, perichondritis, epididymo-orchitis, abscess in the buttock, cholecystitis, pericarditis, arteritis, bronchopneumonia and empyema were all recorded. Abscesses of the buttock and the breast were seen in New Guinea natives (Cases N V and N VI respectively).

Signs.

In the absence of systematic clinical investigations, the incidence of signs and symptoms can be discussed in a general manner only. Comment here will be limited to the cardinal features of the salmonella fever syndrome.

Incubation Period.—Consideration of the Soputa group of cases suggests that the incubation period is about a fortnight.

Fever.—Fever and toxæmia were the main features of all cases. In uncomplicated salmonella fever the average duration of fever was fifteen days. When complications occurred, these either greatly prolonged the fever or caused a recrudescence after an apyrexial period of about a week. The average duration of continuous fever in cases in which complications were present was thirty-two days. The duration of continuous fever in 22 cases of salmonella fever and in 21 complicated cases is shown in Figure II. The longest total period of fever occurred in

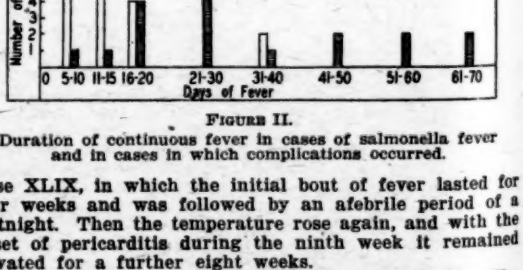

FIGURE II.
Duration of continuous fever in cases of salmonella fever and in cases in which complications occurred.

Case XLIX, in which the initial bout of fever lasted for four weeks and was followed by an afebrile period of a fortnight. Then the temperature rose again, and with the onset of pericarditis during the ninth week it remained elevated for a further eight weeks.

Rigors did not occur in the absence of malaria. The rise and fall of temperature was gradual, and at the fastigium it usually ranged between 102° and 104° F. In uncomplicated cases the pulse rate was relatively slow. Figure III shows the temperature chart in a case of

uncomplicated salmonella fever. Figure I is the temperature chart in Case XXXVIII, which terminated fatally at the end of the second week.

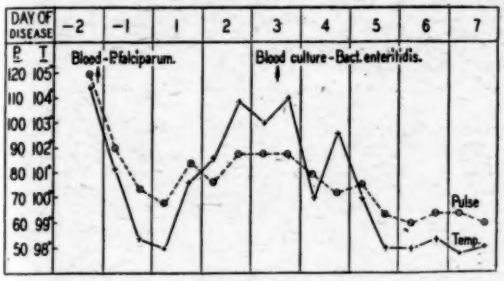

FIGURE III.

Temperature chart in Case X. The febrile period was much shorter than in most cases, but the change in the pulse: temperature ratio with the onset of salmonella fever is well shown.

Rash.—A rash probably due to salmonella infection was observed in six cases.

The patient in Case XVII was an orderly in a medical unit. He had an erythematous rash on the first day of the illness. This became macular on the second day and purpuric on the elbows and in the groin on the fourth day. A culture was grown from the blood on the eleventh day. The rash faded slowly, but on the fifteenth day rose spots were noticed on the abdomen.

In three cases the rash consisted of rose spots similar to those seen in typhoid fever. These appeared at the end of the first week of the disease in Cases XXIV and XXXIV, and at the beginning of the third week in Case V. In Case XXIV, which terminated fatally, the rash became more extensive, and on the abdomen and legs the macules became confluent. In Case XIX the rash seen on the fifth day was thought to be due to dengue fever, but the disease proved to be salmonella fever, and in Case XXXI a faint rash was seen on the abdomen on the twelfth day.

Spleen.—The presence or absence of splenic enlargement was noted in 37 cases; 20 of these patients had concurrent malaria. The spleen was palpable in 15 of these, and tenderness under the left costal margin was noted in another two. Of 17 cases not complicated by malaria, the spleen was palpable in seven, and tenderness under the left costal margin without palpable enlargement of the spleen occurred in one case.

Lymphatic Glands.—Significant enlargement of the lymphatic glands did not occur.

Abdominal Distension and Diarrhœa.—Abdominal distension occurred in most cases during the second week of the disease. The abdomen felt "doughy", and generalized tenderness was evident. Diarrhœa usually accompanied the abdominal distension, and lasted for about a week. The stools consisted of fluid fæces with a little mucus, and varied in number from four to twelve daily. Tenesmus did not occur.

Complications.

In twenty-seven cases a variety of complications developed, due to localization of *Bacterium enteritidis*. Several complications often occurred in one case, as may be seen by examining the individual case histories in Table I.

Cystitis.—Cystitis was the commonest complication, occurring in eighteen cases. In four cases hæmaturia was the first sign of infection of the bladder. Cystitis was first noted during the second week in nine cases, in the third week in seven, and in the fourth week in two. The usual clinical findings were suprapubic tenderness, frequency of micturition and scalding. The urine contained albumin, many pus cells and many red blood cells, and *Bacterium enteritidis* could always be isolated from it. The cystitis usually subsided in about three weeks.

In Case XXXIV cystitis persisted for ten weeks. After a course of sulphadiazine therapy the urine became sterile and normal on microscopic examination; but the condition subsequently relapsed and failed to respond to further sulphonamide therapy. Five months after the onset of the disease cystoscopy was performed and revealed cystitis. Cultures from urine taken from the bladder and the left kidney yielded *Bacterium enteritidis*. No abnormality was detected in a retrograde pyelogram.

Epididymo-Orchitis.—Epididymo-orchitis occurred in six cases. In one case it was bilateral, and in the others one side only was involved. Usually it followed shortly after the onset of cystitis, but in the case in which bilateral infection was present, the left testis was inflamed before cystitis was evident. Inflammation of the testis and epididymis usually subsided within three weeks.

Periostitis.—Periostitis occurred in four cases, commencing in the second week of illness and lasting for three or four weeks. In one case a painful swelling arose from the left ulna just below the olecranon. In two cases pain and tenderness were present over the end of the left acromion, with limitation of abduction and wasting of the deltoid muscle. In the fourth case fullness and tenderness were present over the region of the right sacro-iliac joint. In no case could bony change be detected in X-ray photographs of the affected regions.

Perichondritis.—In one of the cases in which periostitis of the left acromion was present, a painful, tender swelling developed over the left fifth and sixth costo-chondral junctions during the sixth week of fever. This persisted for eight days and then subsided.

Bronchopneumonia.—Bronchopneumonia occurred in six cases. In the two fatal cases (Cases XXIV and XXXVIII) signs of consolidation developed in both lungs on the sixth and twelfth days respectively. No attempt at culture from the sputum was made in the first case, and in the second no hæmolytic streptococci or pneumococci were grown on a blood-agar plate, but *Bacterium enteritidis* was not especially sought. In Cases XXXI and XXXII bronchopneumonia developed in the second week, and in the latter *Bacterium enteritidis* was grown on culture from the sputum. Bronchopneumonia was followed by the development of a sterile pleural effusion in Case XXX. It is possible that in all these cases the bronchopneumonia was due primarily to *Bacterium enteriditis*.

Empyema.—Two cases of empyema occurred.

In Case XXVI the patient received a penetrating gunshot wound in the left subscapular region. Hæmopneumothorax was diagnosed ten days later, and on the twenty-eighth day thin turbid fluid, from which a pure culture of *Bacterium enteritidis* was grown, was aspirated from the left pleural cavity. Repeated aspiration and later closed drainage resulted in a cure after several months' treatment. No other signs of *Bacterium enteritidis* infection were recorded in this case except continued pyrexia from the fourth day after the injury.

The surgeons were unable to find adequate cause for this fever, and it may have been due to *Bacterium enteritidis* septicæmia.

In Case XXXII, following bronchopneumonia due to *Bacterium enteritidis*, empyema of the left pleural cavity developed in the third week. *Bacterium enteritidis* was grown in pure culture from the aspirated pus. Treatment by continued aspiration was successful.

Pleural Effusion.—In Case XXX a sterile pleural effusion developed during the fourth week of illness; it absorbed after four weeks.

In Case XLIX (see below, "Pericarditis"), a sterile left-sided pleural effusion developed during the twelfth week of the patient's illness. This resolved slowly, and two weeks later a right-sided pleural effusion developed. Fluid was still present in the right pleural cavity during the sixteenth week of the disease. On all occasions the fluid aspirated from the pleural cavities was clear, straw-coloured, and sterile.

Pericarditis.—Case XLIX has been reported elsewhere by Cobley and Wilson.[5]

After an initial bout of jaundice and fever, lasting for four weeks, the patient became afebrile. Epigastric discomfort and diarrhœa then developed, but no pathogens could be recovered from the stool. During the seventh week of the illness the temperature rose for a few days, and pain in the right side of the chest and cough were present. After another afebrile interval of one week the temperature rose again, and *Bacterium enteritidis* var. *bleqdam* was isolated

from the blood. The third bout of fever lasted for eight weeks. During the fourteenth week of the illness the pericardial sac was aspirated and 15 millilitres of turbid yellow fluid were withdrawn, from which *Bacterium enteritidis* var. *blegdam* was isolated. Next day pericardotomy was performed, and 40 ounces of thin pus were aspirated from the pericardial sac. Closed drainage was instituted, the sac being irrigated daily with two litres of saline solution, containing 100,000 units of penicillin per litre. A week later culture from washings from the pericardial sac failed to yield *Bacterium enteritidis* var. *blegdam*, although *Pseudomonas pyocyanea* and *Bacterium coli* were both isolated. Convalescence was slow, but the temperature fell to normal five weeks after the operation. Before evacuation to the mainland the patient was able to walk without dyspnœa or the development of œdema.

Cholecystitis.—Cholecystitis occurred in two cases.

In Case XXXIX the patient suffered his first attack of cholecystitis in the third week of the attack of salmonella fever. It gradually subsided, but five months later he had another acute attack which also settled down. During the whole of this period *Bacterium enteritidis* var. *blegdam* continued to be found in the fæces. Eight months after the original attack fluid was aspirated from the duodenum, and culture from this fluid contained a pure growth of *Bacterium enteritidis* var. *blegdam*. Despite further mild attacks of cholecystitis, the patient refused operation and was discharged from the army as a carrier of *Bacterium enteritidis* var. *blegdam*.

In Case XLII the patient was admitted to a medical unit in New Guinea in January, 1944, with a history of fever, malaise and vomiting of eight days' duration. Examination of a blood film revealed numerous trophozoites of *Plasmodium falciparum*. In spite of intensive antimalarial therapy, including three intravenous injections of quinine dihydrochloride, the temperature remained elevated and vomiting was troublesome for the next four days. Late on the night of the fourteenth day of the illness the patient suffered an attack of severe epigastric pain, and laparotomy was performed. The gall-bladder was found to be distended and tense, with œdematous walls. Eight millilitres of purulent fluid were aspirated. There were no stones in the gall-bladder. Cholecystostomy was performed and the gall-bladder was drained through a stab wound, the main incision being closed. No facilities for cultural examination of the purulent fluid were available, but a smear stained by Gram's method was found to contain numerous pus cells, small collections of bile pigment and occasional clumps of Gram-negative bacilli. The wound healed and the patient was evacuated to Australia. Six weeks after operation a cholecystogram revealed a non-functioning, diseased gall-bladder. However, as the wound was now healed, the patient was returned to duty.

After being discharged from hospital he suffered from vague gastro-intestinal symptoms and intermittent diarrhœa. He was readmitted to hospital in August, 1944, and *Bacterium enteritidis* var. *blegdam* was isolated from the fæces. Frequent culture from fæces during the next four months invariably yielded *Bacterium enteritidis* var. *blegdam*. The symptoms had not been relieved by rest or dietetic measures, and in December, 1944, eleven months after the original operations, cholecystectomy was performed. The gall-bladder contained no stones and the wall was thin and apparently normal. A culture from bile from the gall-bladder contained a pure growth of *Bacterium enteritidis* var. *blegdam*. The wound became infected, but cultural examinations of the stools now failed to yield any pathogens. The wound soon healed and the patient was discharged from hospital, free from salmonella infection, just over a year after his original admission to hospital.

Arteritis.—Brachial arteritis occurred in Case XXXIII. This patient was feverish for six days. Blood culture was not attempted at this stage. He still appeared ill after the fever had subsided, and on the ninth day there suddenly developed death-like pallor in the right hand with absence of the radial pulse and a tender swelling in the antecubital fossa. The circulation in the forearm improved in two hours, but a tender swelling remained in the area of the brachial artery for seven days.

Abscess.—One patient (Case XXXVII) bruised his right buttock while delirious, and at the end of the second week a large, deep-seated abscess developed at this site. Pus from the abscess yielded a pure growth of *Bacterium enteritidis*. This case calls to mind one mentioned by Lawes and Keon-Cohen,[6] in which pus from a large abscess in the upper part of the thigh of a Papuan native (N V) yielded "*Bacillus Gärtner*". This organism was later identified as *Bacterium enteritidis* var. *blegdam*.

A pure culture of *Bacterium enteritidis* var. *blegdam* was obtained from material aspirated from a breast abscess in a native woman (N VI) in Bougainville Island. This patient had been admitted to hospital suffering from diarrhœa, and was apyrexial. An abscess of the breast developed, and she died suddenly a few days later. No post-mortem examination was possible.

Coexistent Diseases.

Malaria.—All patients had been exposed to the risk of malaria infection, many of them in the early days of the Papuan campaign, when preventive measures were not efficiently organized. A large number of the patients were admitted to hospital with symptoms and signs of malaria, and parasites were found in the peripheral blood shortly after their admission to hospital. It was only when the patient failed to respond to antimalarial therapy, or when the toxæmia was greater than would be expected in *Plasmodium vivax* malaria, that enteric fever was suspected and appropriate examinations were carried out. Thick blood films were repeatedly examined in all cases, and parasites were found in 35. In 29 cases (17 *Plasmodium vivax*, 12 *Plasmodium falciparum*) they were found shortly after admission of the patient to hospital; in the other six (four *Plasmodium vivax*, two *Plasmodium falciparum*) they appeared during the course of the disease or early in convalescence. This high proportion of patients admitted to hospital suffering from malaria and being at the same time in the early stages of salmonella fever, suggests the possibility that an attack of malaria may considerably lower resistance to *Bacterium enteritidis*. The figures given in Williams, Sinclair and Jackson's[7] review of scrub typhus in New Guinea provide an interesting comparison, for both series of cases came from approximately the same population groups. In 626 cases of scrub typhus 82 patients had an attack of malaria whilst in hospital, most of these attacks occurring during convalescence.

Infective Hepatitis.—Many of the early patients were slightly icteric on their admission to hospital; but this was probably due to the repeated attacks of malaria from which many of them had suffered. In three cases, however, the patient was admitted to hospital with what was considered to be infective hepatitis, and subsequently developed salmonella fever.

In Case XLI the patient was admitted to hospital with jaundice. *Plasmodium falciparum* was found in a blood film examined shortly after his admission. Nine days after the onset of the jaundice and vomiting the temperature rose again, and a characteristic attack of salmonella fever followed.

The patient in Case XLVI was admitted to hospital with a history of fever, anorexia, headache and vomiting, and of having passed dark urine. Examination of the urine showed that bile salts and bilirubin were present in large amounts. The condition passed straight on to salmonella fever.

In Case XLIX the patient was admitted to hospital with fever and jaundice. The fever persisted for four weeks and then after a fortnight's interval recurred, and a culture was grown from the blood. This patient later developed pericarditis.

Laboratory Investigations.

Leucocytes.

The results of leucocyte counts are summarized in Table II.

In uncomplicated cases of salmonella fever, and in cases of the septicæmic type in the early stages of the illness, before complications due to localization of infection had occurred, the leucocyte count was reduced. In only six cases of the 25 investigated was the number of leucocytes greater than 8,000 per cubic millimetre.

When infection became localized, the leucocyte response varied, but usually the figure rose to about 10,000 per cubic millimetre.

Cultural Examination of the Blood.

Culture from the blood was attempted in 38 cases and the results are shown in Table III.

TABLE II.
Leucocytes per Cubic Millimetre.

Week of Disease.	Salmonella Fever and Septicæmic Type before Complications.			Septicæmic Type after Complications.		
	Cases.	Average.	Range.	Cases.	Average.	Range.
First	8	5,400	2,700 to 9,500			
Second	12	6,500	1,300 to 16,000	3	10,800	10,700 to 10,900
Third	5	5,600	4,300 to 8,400	3	12,200	7,500 to 16,500
Fourth				4	9,500	5,000 to 17,800

Consideration of the 13 cases in which attempted culture from the blood was unsuccessful suggests that earlier attempts would have been successful. Culture was not attempted in 12 cases; but a review of these cases indicates that, had the attempt been made in the first or early in the second week in all but one of these cases (Case I), it would have been successful.

In five cases a further cultural examination of the blood was made in the third or subsequent weeks after positive results had been obtained earlier. In one case only was

TABLE III.
Results of Cultural Examination of Blood.

Week of Disease.	Number of Cultures Attempted.	Number Successful.	Number Unsuccessful.
First	9	9	0
Second	19	15	4
Third and subsequent ..	10	1	9

the organism isolated again—namely, Case XXXIV—in which culture was successful on the seventh and twentieth days. An attempt at culture from the blood was made on the first day of illness in Case XX and was unsuccessful, but a positive result was obtained on the sixth day.

In Case XLIX culture was first attempted on the fifty-eighth day and was successful, although a negative result was obtained seventeen days later. The definition of the first day of the attack of salmonella fever was difficult in this case, owing to a preexistent or coexistent attack of jaundice.

Agglutination Reactions.

Weil-Felix Reactions: *Proteus OXK.*—Agglutination tests against Proteus OXK were carried out in 27 cases. In one case only was the titre more than 1/25, and that patient had suffered from scrub typhus three months earlier. The titre in this case was 1/120.

Bacterium enteritidis var. *blegdam.*—The agglutinin response with *Bacterium enteritidis* var. *blegdam* was not satisfactorily investigated. A formol-saline suspension of the organism isolated from the blood in Case XXX was used in the tests performed. The amount of "H" agglutination present was read macroscopically after four hours in a water bath at 56° C. Tests were carried out in 22 cases, serum being collected after the end of the third week of the disease. The results are set out in Table IV. In the majority of cases only one test was performed, but in Case XLIII tests on the seventh and thirty-eighth days revealed a rise in titre from 1/40 to 1/160, and in Case XL tests on the twenty-sixth and thirty-seventh days revealed a rise from 1/320 to 1/1,280. Little can be deduced except that agglutination tests with an emulsion of *Bacterium enteritidis* var. *blegdam* may prove useful in diagnosis in cases in which cultural examination of blood, fæces and urine has not been attempted or has given negative results.

TABLE IV.
Agglutination with Bacterium enteritidis *var.* blegdam "H".

	Maximum Titre.						
	1/25	1/160	1/250	1/500	1/1000	1/1250	1/2500
Number of cases ..	3	1	5	6	4	2	1

Fæces.

Examination.—Observations on the macroscopic and microscopic character of the stool were recorded in 36 cases. Abnormal stools were observed in 29 of these cases during the following periods:

First week only (usually sixth or seventh day)	7
Second week only	12
Third week only	2
Fourth week only	1
Fifth week only	2
Second and third weeks	1
Second to sixth weeks	2
Fourth and fifth weeks	2

The stool usually consisted of fluid fæces containing little mucus, and microscopic examination revealed a few pus and epithelial cells amidst the fæcal debris. Occasionally, however, blood and mucus were present and the exudate was highly cellular.

Cultural Investigation.—If any mucus was present in the fæces, it was washed in sterile saline solution and plated directly on MacConkey's agar, desoxycholate-citrate agar, or "Difco" Wilson and Blair's medium. If no mucus could be found, a small amount of fæces was plated directly or after enrichment for eighteen hours in tetrathionate medium. Enrichment was used in only a few cases of this series. On Wilson and Blair's medium *Bacterium enteritidis* var. *blegdam* gave black colonies not unlike those of *Bacterium typhosum*, but without the characteristic surrounding metallic sheen produced by the latter organism.

Culture from the fæces was attempted in 48 cases. The results are shown in Table V in terms of the stage of the illness.

TABLE V.
Results of Cultural Examination of Fæces.

Culture.	Total.	Week of Disease.													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Cases[1]:															
Culture obtained	33	5	17	3	3	2	2	1	—	—	—	—	—	—	—
Culture not obtained	15	1	6	2	1	2	2	1	—	—	—	—	—	—	—
Specimens[2]:															
Culture obtained	56	6	16	5	6	6	6	4	1	2	0	2	0	0	2
Culture not obtained	87	5	8	7	12	11	11	9	6	6	2	3	4	1	2

[1] The first positive culture obtained, or the first culture attempted when all specimens gave negative results, is recorded.
[2] When more than one specimen was examined during any week, all but one result for that week has been excluded from the table.

In Case XLVI a culture was obtained from the stool, although diarrhœa had never occurred. In several cases culture of *Bacterium enteritidis* in the early weeks of the disease was associated with diarrhœa and the organism continued to be excreted in the fæces for a considerable period after diarrhœa had ceased. In four cases one negative finding intervened between successive positive results, and in one case two negative findings intervened between successive positive results.

Figure IV shows the periods over which cultures were obtained from the stools in nine cases in which several examinations were made. *Bacterium enteritidis* var. *bleqdam* was excreted in the fæces of two patients (Cases XXXIX and XLII) for prolonged periods. Both these men suffered from cholecystitis. Fæcal cultures were obtained in Case XXXIX from the twenty-ninth to the two-hundred-and-eighth day of the disease, at which stage the patient was discharged from the army, having refused cholecystectomy. One patient (Case XLII) suffered from acute cholecystitis in January, 1944, but fæcal culture was not attempted till eight months later. Cultures were then regularly obtained until cholecystectomy was performed four months later.

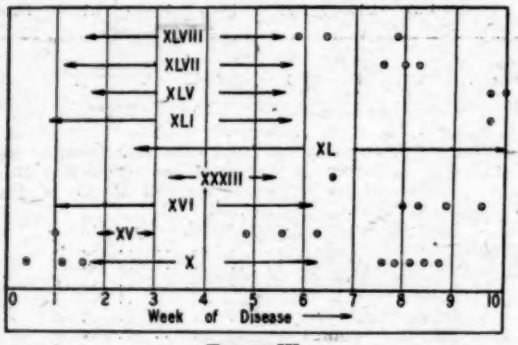

FIGURE IV.

Diagram illustrating the period for which the organism could be grown on culture from the fæces. The number on each line represents the case number (see Table I). When negative results were obtained before or after the positive results, the days of negative results are shown by a point within a circle.

Urine.

Chemical and Microscopic Examination.—Albuminuria, often associated with the presence of hyaline and granular casts, was observed in several cases of uncomplicated salmonella fever at the height of the illness. It disappeared as the elevated temperature subsided. The commonest complication in this series of cases was cystitis. When it occurred, the urine contained many pus cells and usually many red cells, and culture from such urine always produced a positive result. Hæmaturia was the first sign of cystitis in four cases, but it never lasted for more than two days.

Cultural Examination.—The centrifuged deposit was plated on blood agar. Cultural examination of the urine was made in 44 cases, and cultures were obtained at some time in 18. When a cellular deposit was present in the urine, *Bacterium enteritidis* could always be obtained. In only one case (Case V) was a culture grown from the urine in the absence of an abnormal cellular deposit, and in that case cultural examinations a week and a fortnight later respectively both gave negative results. The results are shown in Table VI in terms of the stage of the illness at which the first culture was obtained, or the first cultural examination attempted if all specimens gave negative results.

The periods during which *Bacterium enteritidis* was excreted in the urine are shown in Figure V. Prolonged excretion of the organism was a feature of Case XXXIV, in which the urine yielded cultures for ten weeks; the condition then apparently cleared up, but relapsed, and the urine still contained the organism five months later.

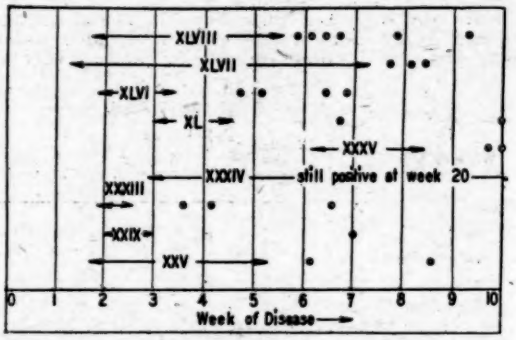

FIGURE V.

Diagram illustrating the period for which the organism could be grown on culture from the urine. The number on each line represents the case number (see Table I). When negative results were obtained before or after positive results, the days of negative results are shown by a point within a circle.

Other Pathological Materials.

Sputum.—*Bacterium enteritidis* was isolated from the sputum of one patient (Case XXXII), who was suffering from bronchopneumonia. Cultural examination of the sputum of the other five patients with bronchopneumonia was either not attempted or gave negative results.

Pleural Fluid.—Clear, sterile, pleural fluid was obtained from the pleural cavities in Cases XXX and XLIX. Pus from empyemata yielded a pure culture of *Bacterium enteritidis* in Cases XXVI and XXXII.

Pericardial Fluid.—Purulent fluid was withdrawn from the pericardial sac in Case XLIX, and yielded a pure culture of *Bacterium enteritidis*.

Duodenal Contents.—Duodenal contents were aspirated in three cases, in which excretion of the organism in the fæces had been prolonged. In Cases XXXIX and XLII culture from the duodenal fluid produced a positive result.

Abscess Fluid.—In Case XXXVII pus from a deep-seated abscess on the buttock yielded a pure culture of *Bacterium*

TABLE VI.

Results of Cultural Examination of Urine.

Culture.	Total.	Week of Disease.												
		1	2	3	4	5	6	7	8	9	10	11	12	13
Cases[1]:														
Culture obtained	18	0	9	4	1	2	1	1	—	—	—	—	—	—
Culture not obtained	26	5	11	1	6	0	1	2	—	—	—	—	—	—
Specimens[2]:														
Culture obtained	35	0	9	7	5	5	4	1	1	2	1	0	0	0
Culture not obtained	105	5	20	5	12	13	10	12	8	7	5	5	2	1

[1] The first positive culture obtained, or the first culture attempted when all specimens were negative, is recorded.
[2] When more than one specimen was examined during any week, all but one result for that week has been excluded from the table.

enteritidis. In two New Guinea natives the organism was obtained from an abscess of the buttock (N V) and a breast (N VI) respectively.

Diagnosis and Differential Diagnosis.

Early and repeated cultural examination of the blood in all cases of unexplained fever, and the isolation of the causative organisms from the fæces, the urine or collections of pus later in the disease, constitute the most important investigations necessary for the diagnosis of infections with *Bacterium enteritidis* var. *blegdam*.

The results of agglutination reactions with formolized emulsions of *Bacterium enteritidis* var. *blegdam* suggest that such reactions may be useful in cases in which the organism has not been isolated. However, further study of the agglutinin response is necessary before the value of such tests is assured.

Infections with *Bacterium enteritidis* var. *blegdam* must be differentiated from the other fevers commonly encountered in the tropics. No attempt will be made to discuss all the problems in differential diagnosis. In this series of cases the commonest error in the early stages of the illness was to ascribe all the symptoms found to malaria. Many patients were admitted to hospital owing to an attack of malaria, but the symptoms and fever failed to respond to adequate antimalarial therapy, and *Bacterium enteritidis* var. *blegdam* was then isolated from the blood, fæces or urine.

During the early months of military operations in New Guinea, before the symptomatology of scrub typhus was well known and before enteric fever due to *Bacterium enteritidis* var. *blegdam* had been recognized, these two diseases were commonly confused. Clinically the most important points in differentiation are the presence of an eschar and of lymph gland enlargement in scrub typhus and their absence in enteric fever. The positive Weil-Felix reaction in scrub typhus or the isolation of the causative organism in salmonella fever confirms the clinical differentiation of these two diseases.

An epidemic of dengue fever occurred at Finschhafen early in 1944, and a number of severe infections were seen. It is possible that a few mild cases of salmonella fever may have been confused with dengue fever during this period, for when cultural examination of the blood was carried out more extensively, a few mild cases of salmonella fever (such as Case XXI) were recognized.

Staphylococcal septicæmia is not uncommon in tropical areas. Leucopenia and the relatively slow pulse rate were useful points in the differentiation of enteric fever from septicæmia caused by pyogenic organisms.

Most patients were admitted to medical wards. A few patients, principally natives, were first admitted to surgical wards suffering from abscesses in the breast or buttock. Surgeons must also be aware of the possibility of *Bacterium enteritidis* infection complicating battle casualties (as in Cases XII and XXVI of this series). Unexplained fever in a battle casualty, especially if accompanied by leucopenia, suggests coincident malaria, dengue, scrub typhus or enteric fever.

Prognosis.

There were four fatal cases of infection with *Bacterium enteritidis* var. *blegdam* in this series. Two of the patients who died were Australian soldiers (Cases XXIV and XXVIII), one was a Solomon Islands native and one was a Japanese prisoner of war.

Fifteen (including two fatal cases) of the 27 cases in which septic complications were observed occurred amongst troops who had been engaged in the exhausting fighting at Soputa, Buna and Gona. Only five of the 22 cases of uncomplicated salmonella fever were found in this group. It is likely that at this time a number of cases of uncomplicated salmonella fever were misdiagnosed as scrub typhus; but it is possible that the exhausted state and lowered resistance of the soldiers engaged in the Papuan compaign predisposed them to septic complications.

In the absence of complications, patients were fit to return to their unit in about six weeks, provided the organism was no longer excreted in fæces or urine. If complications occurred, the period of disability was much greater.

Prophylaxis.

The possible sources of infection have been discussed earlier (see section "Epidemiology"). They indicate that the methods of hygiene and sanitation usually employed to prevent enteric fever should suffice in most cases, but that in addition all food and eating utensils should be protected from contamination with the excreta of rodents.

All soldiers in the Australian Army are inoculated with "T.A.B." vaccine, the initial doses being 0·25, 0·5 and 0·5 millilitre, with a yearly "refresher" dose of 0·5 millilitre. Most of the patients in this series had received their last "refresher" dose within the year prior to contracting the disease.

Topley and Wilson[8] state that the flagellar antigens, and their corresponding antibodies, play little if any part in the mechanism of specific antibacterial immunity, and that the heat-stable somatic antigens and the antibodies that react with them are all-important. *Bacterium enteritidis* var. *blegdam* shares the somatic antigens IX and XII with *Bacterium typhosum*, so that it is difficult to understand why the standard Australian Army "T.A.B." inoculation has apparently failed to confer protection against the *Bacterium enteritidis* var. *blegdam*. The known endemicity of typhoid and paratyphoid fevers in New Guinea and the high morbidity of these diseases amongst Japanese troops compared with their rarity in Australian soldiers indicates that "T.A.B." inoculations have provided good protection against *Bacterium typhosum*, *Bacterium paratyphosum A* and *Bacterium paratyphosum B*.

Atkinson[1] has commenced a series of experiments on the protective effect of vaccination with "T.A.B." vaccine and with *Bacterium enteritidis* var. *blegdam* vaccine. Should *Bacterium enteritidis* var. *blegdam* vaccine prove to be protective, and should ordinary "T.A.B." vaccine prove ineffective, the former should be added to the present triple vaccine when inoculation of troops or civilians destined for the islands to the north of Australia is carried out.

Treatment.

The patient must be isolated as soon as the disease is suspected, and all discharges and excreta must be promptly sterilized. Isolation should be maintained until all abnormal discharges have ceased and until three cultural examinations of fæces and urine at intervals of one week have given negative results. An enrichment technique should be adopted when fæces are being examined for clearance tests.

If examination of thick blood films reveals malaria parasites, antimalarial therapy must be instituted immediately; if no parasites are seen in the films, suppressive "Atebrin" must be administered in doses of 0·1 gramme per day.

Bornstein and Strauss[9] examined the effect of sulphanilylguanidine on different salmonella types. They found that *in vitro* only *Bacterium typhosum*, *Bacterium paratyphosum A* and *Bacterium choleræ-suis* were sensitive. *In vivo*, sulphaguanidine cured mice infected with *Bacterium choleræ-suis*, but had no effect on infections with *Bacterium enteritidis* or *Bacterium typhi-murium*. Later, Beamer[10] described moderately good results with sulphaguanidine in the control of *Bacterium enteritidis* infection in mice.

Sulphonamide therapy was instituted at some time in the majority of the cases described in this paper. Sulphaguanidine was given to all patients suffering from diarrhœa, but it had no effect on the excretion of *Bacterium enteritidis* in the fæces. In Case XXXIV the urine, which had contained the organism for ten weeks, became sterile after a course of sulphadiazine; but this patient relapsed, and in spite of further courses of sulphadiazine *Bacterium enteritidis* was still present in the urine. Sulphamerazine, sulphadiazine and sulphapyridine were all used

on different occasions during the initial febrile stage of the disease, but had no effect upon the course.

Cobley and Wilson[5] reported that *Bacterium enteritidis* var. *bleqdam* was sensitive to penicillin in a concentration of 62·5 units per millilitre, and they considered that the daily irrigation of the pericardial sac with two litres of saline solution containing a total of 200,000 units of penicillin was of some importance in the favourable outcome of their case. Atkinson,[1] with better laboratory facilities, found that growth in nutrient broth was inhibited by a concentration of about 30 units of penicillin per millilitre. It is obvious, however, that penicillin could have no influence upon blood stream infection.

Treatment must therefore be symptomatic, complications being dealt with as they arise. Careful nursing is the most important measure.

Discussion.

Until a few years ago *Bacterium typhosum* and more rarely *Bacterium paratyphosum A*, *Bacterium paratyphosum B* and *Bacterium paratyphosum C*, were the only organisms thought to cause enteric fever in man. Recently several other organisms of the salmonella group have been incriminated as the causative organisms of enteric fever, and this report adds *Bacterium enteritidis* var. *bleqdam* to the number.

It is not certain, from the evidence available, whether infections with this organism have long been endemic amongst the natives of New Guinea, New Britain and the Solomon Islands, or whether they were introduced by the Japanese and spread from them to the native population and to Australian troops. Whatever the origin of the disease, it is now endemic in these islands.

Clinically the disease differs from the common forms of enteric fever encountered in the Australasian region in the frequency with which septic complications occur. As in other enteric infections, it appears that the disease may vary in severity from a symptomless carrier state to a severe illness with multiple septic complications. Simple diarrhœa seems to be a rare manifestation of infection, having occurred only twice amongst the 56 cases here described.

Sporadic cases will probably occur amongst natives and garrison troops in the New Guinea region. Systematic clinical, laboratory and epidemiological study of such cases should clarify many of the points that have as yet been inadequately investigated.

Summary.

1. Fifty cases of *Bacterium enteritidis* infection in Australian soldiers are described. The organism was further identified as *Bacterium enteritidis* var. *bleqdam* in 17 cases. The remainder conformed to the clinical and epidemiological picture of the confirmed cases, and during convalescence the majority of specimens of serum examined gave specific agglutination reactions with a formolized emulsion of *Bacterium enteritidis* var. *bleqdam*.

2. The disease is probably endemic throughout New Guinea, New Britain and the Solomon Islands, and cases have occurred among natives and Japanese in these areas.

3. Clinically, cases fall into two main groups; firstly, enteric fever (salmonella fever) of a fortnight's duration, and secondly, an illness which commences in the same way but in which complications develop owing to localization of infection from the second week onwards.

4. Complications include cystitis, epididymo-orchitis, periostitis, perichondritis, cholecystitis, bronchopneumonia, empyema, pericarditis and arteritis.

5. Malaria occurred coincidentally in a high percentage of cases among Australian soldiers.

6. *Bacterium enteritidis* var. *bleqdam* can be isolated from the blood in the first and second weeks of the disease, and from the fæces and urine in a large number of cases from the second week onwards. In cases in which infection is localized, it can be isolated from the appropriate abnormal fluids.

7. A slight neutrophile leucopenia is present in the first and second weeks of the disease.

8. No specific treatment is known.

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PRELIMINARY REPORT ON STRAINS OF SALMONELLA BLEGDAM CAUSING INFECTIONS IN HUMANS IN NEW GUINEA.

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PRIOR to the recording by Atkinson, Woodroofe and Macbeth[1] of the occurrence of *Salmonella bleqdam* in four cases of enteric-like fever in soldiers in New Guinea, only one culture of this organism had ever been found and described. Kauffmann[2] investigated this culture along with a number of other Gärtner strains and described it as a new serological type to which he gave the name *Salmonella enteritidis* var. *bleqdam*. The culture, labelled number 22, came to him from the Blegdam Hospital, Copenhagen, where it had been isolated in 1929 from the blood of a patient suffering from pneumonia. No history of this patient was given, nor any evidence that the organism was causally associated with the disease. The present report gives definite evidence of the pathogenicity of the organism for man.

The Salmonella Subcommittee[3] revised the Kauffmann-White antigenic table for the salmonellas. Varieties were no longer included in the table, and *Salmonella enteritidis* var. *bleqdam* became *Salmonella bleqdam*.

My collection of strains of *Salmonella bleqdam* consisted of 31 cultures, of which 25 were isolated from human patients, five from laboratory mice and one from a guinea-pig. Table I gives the list of patients from whom *Salmonella bleqdam* was isolated, and the specimens shown to contain the organism.

Details of some of the cases recorded in Table I appear in a report by Fenner and Jackson.[4]

The cultures were by antigenic analysis identified as *Salmonella blegdam* IX, XII: *gmq*. Agglutination tests with O antiserum established the presence of the O antigen IX. The H antigens were detected by agglutination tests with unabsorbed and absorbed H antisera. Suspensions of all cultures produced agglutination with all antisera containing agglutinins for the H antigen *g*. Further tests with absorbed antiserum specific for the H antigens *f*, *m*, *p*, *q*, *u*, showed agglutination with *m* and *q* antiserum only.

TABLE I.
Infections with Salmonella blegdam.

Case Number.	Specimens Containing *Salmonella blegdam*.	Type of Illness.
VII[1]	Fæces.	Salmonella fever.
VIII	Blood.	Salmonella fever.
X	Blood and fæces.	Salmonella fever.
XII	Blood.	Salmonella fever.
XIII	Blood.	Salmonella fever.
XIX	Fæces.	Salmonella fever.
XXIII	Blood.	Salmonella fever.
XXV	Blood and fæces.	Salmonella fever with complications.
XXIX	Blood, fæces and urine.	Salmonella fever with complications.
XXX	Blood.	Salmonella fever with complications.
XXXVIII	Blood, fæces and urine.	Salmonella fever with complications (fatal).
XXXIX	Fæces and bile.	Salmonella fever with complications.
XLI	Fæces.	Salmonella fever with complications.
XLII	Fæces and bile.	Salmonella fever with complications.
XLIII	Urine and fæces.	Salmonella fever with complications.
XLV	Blood, fæces and urine.	Salmonella fever with complications.
XLIX	Blood and pericardial fluid.	Salmonella fever with complications.
McCaul[2] ..	Pus from empyema.	Salmonella fever with complications.
Gray[2] ..	Fæces. Heartblood and bile at post-mortem examination.	Ruptured liver, followed by salmonella fever (fatal).
N I	Rectal swab.	Healthy carrier.
N II	Fæces.	Recurrent diarrhœa with fever.
N III	Blood.	Salmonella fever.
N V	Pus from abscess of buttock.	Abscess of buttock.
N VI	Pus from breast abscess.	Diarrhœa, abscess of breast (fatal).
Jap 1	Blood.	Salmonella fever (fatal).

[1] Case numbers are the same as those given in Fenner and Jackson's[4] paper; "N" = New Guinea native; "Jap" = Japanese prisoner of war.
[2] These two cases are not described in Fenner and Jackson's[4] paper, but both patients were Australian soldiers infected in Bougainville Island.

The H antigens of the unidentified cultures were therefore *gmq*. To prove completely the identity of these cultures with *Salmonella blegdam*, mirror agglutinin absorption tests were performed. All agglutinins, both H and O, were removed from *Salmonella blegdam* antiserum by the unknown culture, and from antiserum to this culture all agglutinins were removed by *Salmonella blegdam*.

Several of the cultures were inoculated into mice. The animals died after about four days or longer, according to the dose, and the organism was recovered from the internal organs. Similar doses of dead culture produced no ill effects. Experiments are now proceeding on the protective effect of vaccination with "T.A.B." vaccine and with *Salmonella blegdam* vaccine. *Salmonella blegdam* was not very sensitive to penicillin *in vitro*; growth in nutrient broth was inhibited by a concentration of about 30 units per millilitre.

This collection of cases and cultures provides an interesting extension of our knowledge of salmonella infections. *Salmonella blegdam* is undoubtedly a human pathogen of considerable virulence and invasiveness.

A detailed study of these strains of *Salmonella blegdam* is being made, and a report of this work will appear elsewhere.

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THE SOCIOLOGICAL ASPECTS OF COMMUNITY HOUSING.[1]

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PUBLICATIONS devoted to housing schemes, slum clearance and community planning provide ample information regarding the material requirements and physical necessities of the population. But references to the influence of environmental conditions on mental health and social adjustment are relatively infrequent. One finds also little evidence of an appreciation of the pattern of family life and the psychological needs of the individual—of the importance of the spirit of neighbourhood and the social significance of community relationships.

The sociologist and the architect do not appear to have worked together to devise a plan combining both social and space relationships. Collaboration between these two specialists might reasonably result in a comprehensive scheme designed to serve both cultural and physical requirements. The sociologist, with his knowledge of the structure of the family, its social implications and the emotional needs of its members, has a particular contribution, surely, to make to housing policy. He is experienced in analysing the life of the family and in determining the capacity of individuals to adjust themselves to a material environment. He is aware of social changes, of variations in the pattern of the family, and of new values in the status of its members.

The problem of fitting numerous family situations into homes which serve the needs of various cultural and occupational groups is more the concern of the sociologist than of the architect. A plan which pays due consideration to the material and social needs of families calls for a mutually reciprocal effort on the part of both of them.

Dr. Reimer, assistant professor of sociology at Washington University, was responsible for the direction of a study of the adjustment of family life to apartment houses in Stockholm. This was undertaken in close association with architects, social workers, home economists and social statisticians. The investigation covered the diversified activities of the members of each family with a survey of their social functions. An inquiry was made into the rhythm of family life, the interrelationships of various members, their productive contribution to housekeeping and their participation in common recreation. This intensive and detailed information formed a basis for determining the general style of life, representative of the families for whom housing was to be designed. It showed the intimate connexion between dwelling places and the social activities of their occupants. Thus, any general plan of housing reform should be considered in relation to suggestions for social reconstruction.

The Family as a Unit for Social Reconstruction.

Programmes for adequate housing and the abolition of sub-standard areas, well conceived though they may be, will not eradicate the poverty of present-day social life unless they include also a positive plan for the building of a new society. In this rebuilding, it is generally believed that the unit of construction should continue to be the family, representing as it does an institution

[1] Read at a meeting of the New South Wales Branch of the British Medical Association on August 30, 1945.

anthropologically accepted and biologically and socially determined, as the basic unit of society. Its emergence by an evolutionary process and its survival through successive generations indicate its effectiveness in ensuring the welfare of the individual and the stability of the community in the past.

Continuity of the family group as an integral unit will be determined largely by the maintenance of those values of home life which can survive despite rapidly developing social changes. Home life, however, presupposes a home—an area for the functioning of parenthood and the rearing of a family under conditions most conducive to its general welfare. Here the foundations are laid which determine largely the personality qualities of each child, where parental attitudes and example influence its progress towards social maturity and physical and emotional well-being. Habits and patterns of behaviour become formulated and established during the early suggestible years of the young child in accordance with those obtaining in the home atmosphere.

It is reasonable to expect that schemes for improved housing will be directed towards providing those material comforts and advantages which make it possible for parents to make a maximum contribution to the general security of the family while maintaining a decent standard of living. But houses, in my opinion, will continue to be less important than the people who live in them, and the structure of the family group more significant than the structure in which its members make their home.

Changes in the Traditional Structure of the Family.

As a social institution, the structure of the family of the past has conformed to a fairly conservative pattern with its interrelationships, its standard of ethical behaviour, its sharing of social obligations and the passing on of conventionally accepted customs. Previously, the role of each member of the family was more or less culturally prescribed. But increasingly, social and economic forces have operated and continue to operate in altering the traditional pattern of the family unit, threatening to jeopardize its integrity. These trends, already evident in previous generations, have been accelerated under war-time conditions, which have revealed an already existing deterioration in the stability of the family.

There has been a cultural lag in social institutions which have failed to keep pace with individual requirements, nor has the environment been modified sufficiently rapidly to satisfy the emotional needs which vary with progressive development and become more insistent in a national crisis such as war. The traditional pattern of the family is changing at a rate for which we have as yet formulated no effective design.

The transition from domestic industry to the factory system, and specialization resulting from mass production methods, have affected the organization of the family, which now functions rarely as a productive economic unit. Already it is surrendering certain of its original and inclusive functions to other agencies of society. Gradually such agencies — protective, educational, religious and economic—have developed and become specialized in performing functions belonging exclusively to the family of the past. This delegation of responsibility affects adversely the prestige and status of the parents.

The family is no longer a self-sufficient unit. It has lost to some extent its previous assurance and social power. Family bonds have weakened, the interdependence of its members is less evident, and there is a decreasing opportunity for the sharing of common interests and for identification in similar endeavour. There is isolation of family members during both working and leisure hours, and less and less opportunity for the family to congregate together. With the lessening in importance of the family, there is a progressive waning of the home as a social centre. Unprecedented freedom for growing boys and girls, who demand prematurely the privileges while ignoring the responsibilities of adult status, takes them into the community in search of interests external to the home. Confusion has arisen also from bewildering conflicts in social usages, while changes in ethical standards result in a revolt against traditional morality.

With the development of flats, tenements and apartment houses, children are driven out from the narrowing confines of the home to play in small backyards, lanes and alleyways. They are learning to look to the community for entertainment and amusement, much of which is offering in the form of supervised play or commercialized recreation. Inside the home, particularly in the multiple dwelling house, the old-time roomy kitchen has been replaced in many instances by a kitchenette, while the popularity of dining nooks indicates a depleted or separated family. Restaurants and delicatessens are making of cookery and kitchencraft rapidly disappearing arts, especially with the rapid growth of women's employment and social interests outside the home. It would appear that our houses are more in the nature of dormitories—places in which the family assembles on rare occasions only. The sociologist may well ask whether the architect of the future will plan in keeping with this change in family relationships, the estrangement of the old and young generations, and the effect of expanding club and commuity life. But the shrinking of houses and the limitations of family life are not due solely to economic causes and the shortage of domestic help. They are in keeping with the trend of the family from the home into the community beyond.

The Cultural Pattern of the Community.

In our modern society no family can live entirely unto itself. It is becoming more dependent on community facilities and resources, participation in which may well endanger its integrity and entity. Since the family has been deprived of many of its earlier socio-economic functions, family members will be required to decide to what extent social services can be utilized as adjuncts to, and not substitutes for, the home.

The changing social pattern which is affecting the fate of the family unit is particularly marked in large cities. The inmates of flats, tenement houses and multiple dwellings are bound by no great ties of neighbourliness—they are nomadic occupants rather than home-makers. Here, men and women live in casual and fleeting relationships with other members of the community and without a fixed attachment to a settled environment. They lack the common interests, associations and traditions of the normal life which grows up in family and in neighbourhood. Thus they tend to become items in a loosely organized group, with a deterioration in a sense of civic responsibility.

McDougall states that "the capacity for social value is found in groups which have some real principle of continuity, some organization and differentiation of function, some constant body of tradition and custom". In a book entitled "The Sociology of Urban Life", Niles Carpenter makes the following statement:

> The anonymity of city life can bring a partial detachment from social obligations, and indulgence in habits of living foreign to the settled pattern of the normal family. Either with the dangerously rich or the desperately poor can a loose and mobile individualism lead to a destruction of local associations, and an indifference to the spirit of neighbourhood, which in turn affects the structure of society.

On the whole, excessive urbanization tends to destroy the life of the family and leads to insecurity and instability in social life, the moving population being divorced from a settled plan of living and experiencing a dearth of continuing friendships. Thus the town planner will need to devise housing schemes and plan community activities which will be a means of real neighbourhood for city people, providing a healthy form of fellowship and some substitute for the local and natural forms of group life.

The authors of a book devoted to the Peckham experiment in London (1926) describe an extension of the frontiers of the family to include a participation in community life, in which shared resources external to the home made for a general enrichment of family experiences. The barrenness of the social life and the relative isolation of people living in close proximity disappeared when

services catering for young and old of both sexes were made available at a low cost to which each individual contributed. Despite the adverse conditions under which these families lived at home, their general physical and emotional well-being improved. The incidence of delinquent and irregular behaviour was kept at a minimum by the provision of adequate facilities for enjoyment of leisure.

Delinquency: Its Relation to Slums and Poverty.

It is generally believed that delinquency is a by-product of congested areas, of improper housing, of lack of privacy and of limited playing areas. Admittedly, the majority of juvenile delinquents are under-privileged children from impoverished, overcrowded homes, in deteriorated localities, where families crowd together in dwelling places of low rental. There is still considerable uncertainty as to the importance of overcrowding as a provocative factor in delinquent behaviour.

Dr. Norwood East, in his investigation of adolescent crime (1942), shows statistically that the relation between density of inhabitants per dwelling and the number of previous convictions is not significant, the correlation being 0·029. In the sexual offence group the number of inhabitants per dwelling is significantly smaller than in other groups.

Dr. Rhodes and Dr. Mannheim and Mr. Carr Saunders published in 1943 the result of an investigation of 2,000 delinquents, with an equal number of controls or non-delinquents from the same environment. These authors make the following statement:

> If parents of delinquents were of lower economic status we should expect to find delinquents coming from poor type houses. There is little evidence of this association in our figures. In cases of overcrowding the association between juvenile delinquents and the control group was 0·05. Equally low was the degree of association between poverty and delinquency.

Thus it would seem that the reactions of adolescents to home conditions are far from being simple and stereotyped, and that other factors operate in determining the incidence of delinquency.

Poverty, so often alleged to be one of the major causes of delinquency, is itself frequently the result of the social inadequacy of the parents. They live in slums chiefly as a result of their low wage-earning capacity, their poor intellectual endowment, or ill health, shiftlessness, indifference and lack of thrift. Their children may become uncontrollable because of unintelligent methods of control and a low standard of parenthood.

In sub-standard areas, a traditional delinquency pattern is readily established, and by a process of psychic contagion, asocial attitudes and unconventional behaviour develop in the more susceptible types of young persons. We have grown accustomed to regard delinquency as a natural sequence to the poverty of interest and lack of entertainment in the typical slum home. Such circumstances, we are led to believe, thrust the young adolescent into the community in search of amusement and relief from the uncongenial conditions in overcrowded homes. One might venture the suggestion that this movement out of the home is part of a developing social change, which is affecting also the members of families belonging to more privileged economic and social groups.

It is in the adolescent particularly that one sees a repudiation of existing social institutions and an impatience of family bonds which interfere with his freedom. The conflict between a youthful aspiration for autonomy and of parental insistence upon dependence is not a new problem. But as adolescence is the period of maximum criminality, it is important that community planners should devise schemes to supply wholesome outlets for activities which will combat undesirable influences. But more than mere occupation is necessary. Continuity of education along broad lines, not necessarily academic, and opportunities for companionship between both sexes should be available.

War-Time Hazards.

In war-time, as in other periods of national upheaval, ordinary everyday life has been disrupted. Absence of the father on active service, employment of the mother, lack of supervision of children, with irregular school attendance, opportunities for child labour, an influx of population into already overcrowded cities, are a few of the hazards that attend war activities and increase the incidence of juvenile delinquency. Standards of behaviour become confused, social controls are weakened, and the broken structure of the family makes for inconstancy and insecurity of home life.

Deplorable living conditions have resulted from the crowding of families in camps, tents and shacks, particularly in defence areas, to which a large number of families has migrated. Moreover, in these mushroom communities, facilities for play and recreation are generally inadequate. In rural districts, juvenile delinquency is less likely to appear on statistical tables. But poor homes and the monotony of life in some small towns can be responsible for undesirable conduct and maladjusted personalities.

In disintegrated neighbourhoods there is little in the way of organized sentiment to combat disturbing influences, and the tradition of delinquency becomes perpetuated. The economic insecurity of the families, the different cultural backgrounds of the groups and the failure of families to recognize their common interests, hamper the development of community spirit and neighbourhood organization.

Development of Neighbourhood and Community Life.

If one accepts as inevitable the changing structure of the family unit and regards the curtailment of its self-sufficiency as an established fact, then community planners will need to devise a programme for a reciprocal relationship between the family and neighbourhood, to the fulfilment of the claims of both. An improvement in cultural associations between neighbours could result from a wider and more generous social life, in which they might regain the cohesive qualities and richer values characteristic of the original family. It is possible that participation in war-time activities might be diverted to shared interest in peace-time projects.

Well-planned housing schemes could safeguard most of the accepted standards of the individual and the family, while providing the basis for a vigorous urban community life without loss of family identity. In the so-called "garden" cities we find encouragement for community life amongst people not too numerous to know something of one another, who can develop friendships and have a sense of common social purpose. Although dependent upon the city to some extent, economically the garden city can remain independent in its social life. But it is the sociologist rather than the architect or town planner who can interpret family needs and relate them to community resources capable of satisfying them.

Preserving the Integrity of the Family while Extending its Social Functions.

The immediate problem lies in conserving privacy as an important element in normal family life, while promoting a development of sociability and opportunities for the normal exercise of social functions. Family life can be enriched or endangered by these excursions into social living and community participation according to the quality of the interrelationships of family members. Homes in which parents and children have interests in common and a mutual understanding of individual problems, make the securest foundation for a stable and enduring social structure. Widening areas of common and shared experiences outside the home will provide new horizons for the modern family. The finest of houses, schools, playgrounds and parks are of minor importance unless children have a stable and secure family life, in which reasonable needs can be anticipated and satisfied. The family is embedded to some extent in a traditional pattern, which a mere change of house or locality will not readily alter without also an accompanying variation in attitudes towards newly assumed responsibilities.

We should be concerned not only with the erection of houses, but with the building up of homes and family life. Unfortunately our homes are becoming merely houses, and home-making has become confused with house-keeping. We need better houses; but we need also an improved standard of family life, a higher quality of parentcraft, a better appreciation of the implications of ethical conduct, and education in civic responsibility.

The popularity of prefabricated houses, ready-made, designed by an external authority, adhering to a fixed pattern, unrelated to the habits of their inmates and assembled in unrelieved groups, may serve as a warning to social planners. Regimentation of living, stereotyped forms of education, lack of incentive and encouragement to independent choice may well result in the formation of "prefabricated" personalities which conform to community patterns, denying the integrity of the individual and curtailing his initiative. In character building man still remains his own architect, and the inadequacy of the individual is no less important than the inadequacy of his environment.

Reconstruction schemes might include a new plan for living in a social situation becoming more complex and demanding, a blueprint which takes into account those traditional qualities of the family of the past which can be socially useful in the future. One can still envisage a home as the rendezvous of the family, where the emphasis is on companionship rather than on authority, and where sustaining loyalties keep the family intact. The social influence of such an institution will be enduring, if isolation and non-contributing individualism do not parade as privacy, and if community privileges and responsibilities are acknowledged and honoured.

So only will the structure of society be maintained in keeping with the broad design of the family, for which there has been found as yet no satisfactory substitute. But it is to the sociologist as much as to the architect, the town planner and the builder of community centres that we must look for direction in social reconstruction which respects the psychological as well as the material needs of the population.

COMPOUND FRACTURES OF THE EXTREMITIES DUE TO GUNSHOT WOUNDS: THE EARLY RESULTS OF TREATMENT IN THE FIELD AIDED BY PENICILLIN THERAPY.

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In this paper are presented the early results obtained in the treatment of 126 compound fractures of the extremities caused by gunshot wounds. (Gunshot wounds of joints are excluded from this series.) These casualties were first treated in forward surgical units and were then followed up for at least one month after being wounded, either by ourselves or by the courtesy of general hospital surgeons. Attention is focused on the healing of soft tissues, and no data are presented with regard to bony union or ultimate function.

These wounds were caused by the various missiles of modern warfare. They were of all types—perforating wounds with small entry and exit wounds, perforating wounds with large entry and exit wounds, penetrating wounds with pieces of metal retained in the bone, and gutter wounds. At times the force of impact shattered the missile so that metallic foreign bodies were scattered throughout the bone and soft tissues, even multiple exit wounds being caused. In most instances the bones were shattered at the site of fracture, and many of the fragments became secondary missiles causing widespread soft-tissue damage. Secondary fracture lines sometimes radiated up and down the shafts to implicate the articular surfaces of neighbouring joints and cause hæmarthroses.

Usually much soft-tissue destruction with hæmatoma formation had occurred, often causing excessive tension beneath intact fascial sheaths. Skin involvement varied from simple perforation to gross destruction, the latter being seen most frequently in fractures of the tibia. In some cases, neighbouring nerves and vessels were injured either by concussion or by actual division. In only one case was a main limb artery divided.

Most wounds were contaminated by dirt, vegetation and clothing, and some were already infected before surgical treatment owing to difficulties in collecting the patient from the jungle.

The simplest types of wounds were those due to rifle bullets travelling at high speed. They caused a minimum of soft-tissue destruction, provided that the bones did not cause them to deviate or to wobble, when enormous exit wounds eventuated. Even in these cases, however, bone damage was always great.

Treatment.

The aims of the early treatment of compound fractures in the field are, firstly, to save life, and secondly to save the limb—and in the case of the latter, this virtually means to prevent or minimize infection. MacFarlane[10] points out that when the blood supply is sufficient, nowadays not only can one save the majority of these limbs, but one can expect union to occur in reasonable position and without gross infection. This is due to adequate surgical measures, aided by the parenteral use of penicillin, which allows early closure of wounds, minimizes local infection and prevents spreading sepsis by penicillin-sensitive organisms, and by the local use of "Monacrin", which minimizes and helps clear up local infection due to both penicillin-sensitive and penicillin-resistant organisms.

Details of Treatment.

Field dressings and emergency splints were applied on the recovery of the patient from the jungle. Sulphamerazine was administered by mouth until penicillin therapy was able to be instituted, when 15,000 units were injected intramuscularly every three hours. Gas-gangrene antiserum and tetanus toxoid were given as a routine measure in all cases. Patients with multiple or gross injuries or fractures of the large bones required resuscitation. Stored or fresh blood was used in all instances, as their shock-like state is due to actual loss of blood, either externally or internally into the surrounding tissues, and serum is not sufficient to restore them.[12] Blood was always given rapidly at first (one litre in twenty minutes) and then at a slower rate until the patient's condition was judged suitable for operation. When facilities were available, all injured parts were radiologically examined and foreign bodies localized prior to operation.

Certain fractures due to high-velocity non-wobbling rifle bullets did not require surgical intervention, because these bullets do not carry in clothing and are self-sterilizing[13] The wounds of entrance and exit were small, there was no pronounced hæmatoma formation, and no foreign bodies were present. Such fractures were immobilized only, unless they were infected or surrounded by large muscle masses, as in the case of the femur, when operation was performed.

In all other wounds, clean or infected, surgical excision was performed under "Pentothal" anæsthesia, the soft tissues being dealt with first. Care was taken to excise all damaged tissue, to split enveloping fascia widely, especially that ensheathing large muscle masses as in the thigh or calf, and to evacuate hæmatomata. All organic foreign matter and dirt were removed, as neglect of this precaution is the main cause of later infection.

Damaged bone was dealt with as conservatively as possible, only small loose pieces being removed. There is no excuse for the removal of unnecessary fragments,[6] and even large free ones should not be removed, as it is thought that penicillin therapy enables them to act as bone grafts.[11] Pieces of bone blasted into the soft tissues

away from the fracture were always removed. Metallic foreign bodies were removed from the bone whenever possible. Bentley and Thomson[2] state that this is necessary, as such foreign bodies cause harm, whereas Burns and Young[4] disagree with this. Naturally, small foreign bodies scattered through the bone and difficult to distinguish from bone fragments must be left behind, and they become incorporated in the healed shaft.[4][14]

In those cases in which fracture lines radiated down to neighbouring joint surfaces causing hæmarthroses, no extra treatment was necessary save when a large joint was involved, when the blood was aspirated and 50,000 units of penicillin were injected into the joint cavity.

After hæmostasis had been secured by fine catgut ligatures when necessary, the wound was insufflated with penicillin-sulphanilamide powder (5,000 units of penicillin per gramme of powder). Consideration was now given to the advisability of primary suture. This was performed only in the case of clean wounds excised within a few hours of reception, which had not been contaminated with dirt or organic material, which were associated with minimal skin loss and soft-tissue damage, and in which no metallic foreign bodies were left *in situ*. Even if the foregoing criteria were satisfied, suture was performed only when the patient could be observed for one week before evacuation. The skin only was stitched with interrupted sutures of nylon or silkworm gut. If the wound was not sutured, it was covered with "Vaseline" gauze and dressings were applied.

If no X-ray examination had been made, one was carried out as soon as possible before wound revision was undertaken, on about the fourth of fifth day in cases in which suture was not performed. Any necrotic tissue or accessible metallic foreign bodies missed at the original operation were removed and hæmatomata were evacuated. If the wounds were clinically clean, and if suture could be carried out without tension, this was performed after insufflation of penicillin-sulphanilamide powder. (As the clinical appearance of the wound is the deciding factor as to the advisability of suture,[4][5][21] in this series bacteriological investigations were made only in the case of obviously infected wounds.) Even a raised temperature is not a contra-indication to suture,[4] because it may be due to impurities in the penicillin.[11]

If the wounds were clean but œdematous, then they were insufflated with penicillin-sulphanilamide powder and dressed with "Vaseline" gauze. They were again reviewed at intervals of four or five days and sutured as soon as circumstances were favourable. The longer suture had to be delayed after ten days, the greater was the necessity for wound excision, undermining of surrounding skin and rotation of local flaps. Wounds associated with great skin loss required split skin grafts as soon as local conditions were satisfactory. Their purpose was to act as temporary cover only to obviate secondary infection, and they were usually replaced by plastic means later. Many fractures were still open at the end of a month or longer after reception of the wound, and these patients were evacuated for plastic repair.

Tubes for the local injection of penicillin, as favoured by Bentley and Thomson[2], were not used in this series. Many authorities[4][11][17] have found that they lead to secondary infection by penicillin resisters (*Bacillus proteus, Bacillus coli Pseudomonas pyocyaneus*) and even to sinus formation,[4] a complication which occurred in certain of our early cases.

In spite of early and apparently adequate excision, some wounds became infected. As soon as this was apparent, they were revised, necrotic material was excised, foreign bodies were removed and adequate drainage was provided by enlargement of the wound and counter-incisions where necessary. Sutures were released in wounds already sutured and the wounds were left open. Other wounds were infected before initial surgical treatment could be undertaken. These were surgically excised, foreign bodies were removed just as thoroughly as if the wounds were uninfected, and adequate drainage was provided by incision of skin and fascia.

The Local Use of "Monacrin."—Instead of applying penicillin-sulphanilamide powder to these infected wounds, 5-amino-acridine ("Monacrin") was used.[20] This is efficacious locally, not only against the pyococci, but also against *Bacillus coli* and to a lesser extent *Bacillus proteus*. It has no effect on *Pseudomonas pyocyaneus*, but if this organism is present "Monacrin" may be combined with a 2% solution of acetic acid. Shallow wounds were syringed twice a day with a 1/1,000 solution of "Monacrin", and then gauze soaked in the solution was applied. Surgical gauze has been shown to adsorb "Monacrin", but it allows it to diffuse into the tissues, so acting as a reservoir of "Monacrin".[1] Tubes attached to a "Soluvac" flask full of the solution were stitched into deep wounds, and the solution was allowed to drip continuously through them at the rate of eight drops per minute, until the infection was overcome. This treatment was continued until the wounds were clean and able to be sutured, or until plastic repair could be performed.

Not only is "Monacrin" efficacious against established local infection, but it is useful in those wounds closure of which must be delayed. Such wounds are liable to secondary infection by the Gram-negative, penicillin-resistant bacilli, especially when closed plaster casts are used.[7][8][9] Such infection may be minimized or even prevented by dressing the wounds with gauze soaked in "Monacrin".

The Parenteral Use of Penicillin.—It is well known that all war wounds contain pathogenic bacteria (pyococci and anaerobes) almost as soon as they are received, especially when organic foreign matter is present.[4][10] It has also been shown that air and bacteria may be driven into the tissues far from the missile track[12][10][18] and so escape even the most rigorous excision. The parenteral administration of penicillin will "freeze" these bacteria from the rest of the body and so prevent spread of infection. It cannot, however, prevent local infection when necrotic or foreign organic matter is left *in situ*[15]—only adequate surgical treatment can do this; but here again it ensures that the patient will not die of septicæmia or lose the limb from spreading sepsis.[4][8][11] Consequently, penicillin was injected intramuscularly every three hours in every case of this series, until it was evident that infection was not going to appear in the "clean" wounds and that it had subsided in the "dirty" wounds. Local infection due to penicillin-sensitive organisms, occurring in patients already undergoing a course of penicillin treatment, meant that necrotic material or foreign bodies, and in later cases sequestra, still required removal. In these infections, it was noticed that penicillin rapidly relieved pain in the lesions—a point commented upon by Innis and Ellis.[11] In cases of later suture, in which penicillin therapy had ceased some time before, it was recommenced a day before suture was to be performed and continued until it was clear that no infection would occur.

Immobilization.—No attempt was made to secure perfect alignment at the initial operation, as immobilization and not alignment is the surgeon's business in the forward area.[3][14] Routine methods of immobilization were used, and they will not be discussed here, except for the statement that in no instance was internal fixation used. The main reliance was placed upon the use of plaster casts. Closed plaster casts, padded or unpadded, split or unsplit, have certain grave disadvantages quite apart from the known dangers of limb constriction. Fractures with open wounds in limbs encased in plaster, even when penicillin therapy was being given, rapidly became secondarily infected by staphylococci, *Bacillus proteus, Bacillus coli* and *Pseudomonas pyocyaneus*,[7][8][9] and gross infections from pyococci and anaerobes may occur in sutured wounds without being recognized, especially when the patient is in transit.[8][11] When plaster casts were used in this series to secure immobilization, windows were always cut over the wounds so that they could be inspected and dressed when necessary. Complete casts were not used until the skin was completely healed.

General Treatment.—During the period of treatment, the patient's general condition was watched. Anæmia was treated by repeated blood transfusions, and concurrent diseases such as malaria and hookworm infestations and

skin rashes were treated. Full adequate dietary was ensured.

Results.

In the discussion of the results, the periods of time and amounts of penicillin represent an average figure for each particular group.

Table I is a brief summary of the methods of treatment used in this series. Thus, of the 126 fractures, 31 were of the type requiring no surgical intervention. All wounds healed by first intention, and all patients were given 450,000 units of penicillin, a start being made eight hours after reception of the wound. Thirty-one wounds were treated by primary suture; in four cases the result was a failure. Primary suture was carried out nine hours after reception of the wound; in the successful cases 520,000 units of penicillin were required, and healing was complete in sixteen days. These cases were chosen carefully, and this probably accounts for the small number of failures. Ogilvie[10] and Churchill[9] both state that primary suture should never be performed because the recognition of devitalized tissue is often impossible, and war wounds can never be rendered entirely healthy and sterile by surgical toilet. Nevertheless, the results appear to justify this measure in the treatment of selected clean wounds associated with little soft-tissue damage, and uncontaminated by organic foreign matter, when penicillin therapy is given.

Thirty fractures were treated by delayed primary suture, and there was only one failure. Initial operation was performed eight hours after the reception of the wound; suture was performed about the fifth day; the wounds healed in sixteen days, and 800,000 units of penicillin were required. This period, the fourth to the ninth day, is the ideal time for suture, provided early and adequate surgical excision has been performed.[10][19] At this time, penicillin-sensitive organisms are under control and penicillin-resisters are at a minimum.[11]

Secondary suture was performed in eleven cases, and there were two failures. The initial surgical treatment was given ten hours after reception of the wound, suture was performed on the fifteenth day, and the wounds healed in seventeen days, 1,100,000 units of penicillin being required. The reason for late suture was prolonged œdema in nine cases and established sepsis prior to surgical treatment in two cases.

Thus, in seventy-two cases suture was performed in the first month after reception of the wound, and in seven cases the result was a failure. These failures with their later results are summarized in Table II. As may be seen, infection was the cause of four of the failures.

Table I.
Summary of Methods of Treatment.

Bone Fractured.	Number of Cases.	No Surgical Treatment.	Primary Suture.		Delayed Primary Suture.		Secondary Suture.		No Suture Performed in First Five Weeks.	Amputations.	
			Success.	Failure.	Success.	Failure.	Success.	Failure.		Immediate.	Late.
Clavicle	1	—	1	—	—	—	—	—	—	—	—
Scapula	6	2	4	—	—	—	—	—	—	—	—
Humerus	18	7	3	—	5	—	2	—	—	1	—
Radius	8	2	3	—	3	—	—	—	—	—	—
Ulna	13	4	—	—	6	—	2	—	1	—	—
Metacarpus	4	—	2	—	1	—	1	—	—	—	—
Fingers	14	4	3	—	1	—	—	—	—	4	2
Femur	11	—	1	1	5	1	2	—	1	—	—
Patella	1	—	—	1	—	—	—	—	—	—	—
Tibia and fibula	8	—	—	—	2	—	1	—	5	—	—
Tibia	9	2	2	—	1	—	—	1	3	—	—
Fibula	12	4	5	—	2	—	1	—	—	—	—
Tarsus	2	—	—	—	1	—	—	—	1	—	—
Metatarsus	8	2	2	2	—	—	—	1	1	—	—
Toes	11	4	1	—	2	—	—	—	—	4	—
Total	126	31	27	4	29	1	9	2	12	9	2

Table II.
Unsuccessful Suture.

Case Number and Bone Fractured.	Hours before Initial Surgical Treatment.	Time before Suture.	Day of Failure after Suture.	Cause of Failure.	Result.	Units of Penicillin Used.
I. Femoral shaft	8	8 hours.	Fourth.	Hæmatoma.	Evacuation of hæmatoma, resutured four days later, healing in 14 days.	1,000,000
II. Patella (superficial, with one crack involving the articular surface).	12	12 hours.	Fourth.	Infection (*Staphylococcus aureus* and *Bacillus subtilis*).	Immediate revision performed, healing by granulation in one month; joint not infected.	915,000 and 200,000 into joint.
III. Metatarsus	2	2 hours.	Fifth.	Infection (*Staphylococcus aureus* and *Bacillus proteus*).	Immediate revision performed, healing by granulation tissue in one month.	720,000
IV. Metatarsus	8	8 hours.	Fourth.	Œdema.	Successful suture six days later, healing in 16 days.	1,200,000
V. Femoral shaft	12	6 days.	Fifth.	Infection (*Staphylococcus aureus*).	Immediate revision performed, wound drained for one month, when a sequestrum was removed, after which healing occurred.	2,400,000
VI. Tibia	7	12 days.	Sixth.	Infection (*Bacillus proteus*).	Healed one month later by granulation.	1,080,000
VII. Metatarsus	18	14 days.	Fourth.	Œdema.	Healed two weeks later by granulation tissue.	600,000

Twelve wounds were unable to be closed in the first month after reception, namely: eight fractures of the tibia (Cases I, II, and IX to XIV in Table III) because of skin loss and infection; one fracture of the femur (Case VII, Table III) and one fracture of the tarsus (Case XVI, Table III) owing to infection; and one fracture of the ulna and one fracture of the metatarsus, owing to skin loss alone. At the end of five weeks after reception of the wound, six wounds were still discharging, though in lessening amount, and four were just about ready for plastic measures. Two wounds healed without further surgical treatment, one in five and the other in eight weeks.

It is significant that the delayed healing was partially or wholly due to infection in ten of these twelve cases, and that eight of these fractured bones were badly shattered tibiæ associated with much soft-tissue damage and skin loss. These are the most serious of all limb fractures, because there is so much comminution of the shafts that it may be impossible to eradicate all necrotic tissue and foreign bodies. This fact, as well as the loss of skin, predisposes the wound to local infection in the early stages. In the later stages, sequestra require removal and complicated plastic procedures are necessary for closure of the wound.

Infected Wounds.

The most important complication of compound fractures in warfare is infection. It occurred in 15% to 18% of 1,400 cases reported by Hampton and Parker[(10)] because of inadequate excision. The worst feature of infection is the risk of death from blood-stream invasion or loss of limb from spreading sepsis due to pyococcal and anaerobic organisms—a risk which the parenteral administration of penicillin has minimized.[(11)] In this series there was no instance of severe spreading sepsis, or of blood-stream or gas-gangrene infection. However, local infection by penicillin-resisters, notably *Bacillus proteus*, *Bacillus coli* and *Pseudomonas pyocyaneus*, prolongs healing time, prevents the early closure of wounds and leads to sequestrum formation and persistent sinuses.[(12)] That infection by *Bacillus proteus* is not to be regarded lightly has been shown by Propper-Grashchenkov,[(13)] who showed that open spinal column wounds were associated with a higher mortality rate when infected by this organism. These effects have to some extent been minimized by the local application of "Monacrin".

There were 17 fractures associated with infected wounds in this series, six being already infected before surgical treatment, and eleven becoming infected after surgery. These cases are summarized completely in Table III, in

TABLE III.
Summary of Results of Infected Wounds.

Case Number and Bone Fractured.	Delay before Initial Surgical Treatment.	Organisms.	Units of Penicillin Used Prior to Infection.	Progress.	Units of Penicillin Used to Control Infection.
Wounds Infected Before Operation.					
I. Tibia and fibula	1 week.	*Staphylococcus aureus*, *Bacillus proteus.*	—	Wound excised. Sequestrum removed three weeks later, wound healing a month later.	2,400,000
II. Tibia and fibula	2 days.	*Streptococcus hæmolyticus*, *Bacillus coli.*	—	Wound excised. Ready for plastic repair four weeks later.	1,200,000
III. Metatarsus ..	1 week.	*Staphylococcus aureus*, *Bacillus proteus.*	—	Wound excised. Healed in one month by granulation tissue.	825,000
IV. Metacarpus ..	1 week.	*Bacillus proteus.*	—	Wound excised. Healed in one month by granulation tissue.	400,000
V. Ulna	1 week.	*Staphylococcus aureus*, *Bacillus proteus.*	—	Wound excised, followed by suture five days later, the wound healing in 16 days.	825,000
VI. Ulna	1 week.	*Staphylococcus aureus*, *Bacillus proteus.*	—	Wound excised, followed by suture seven days later, healing in 15 days.	480,000
Wounds Infected After Operation.					
VII. Femur.. ..	10 hours.	*Staphylococcus aureus*, *Bacillus proteus.*	600,000	Abscess evacuated and necrotic bone removed on twelfth day. Drainage still present five weeks later, but lessening in amount.	600,000
VIII. Femur.. ..	—	—	—	See Case V, Table II.	
IX. Tibia and fibula	12 hours.	*Staphylococcus aureus*, with *Pseudomonas pyocyaneus.*	480,000	Heavy discharge on tenth day. Necrotic bone removed. Drainage still present in fifth week, but lessening in amount.	720,000
X. Tibia and fibula	5 hours.	*Bacillus proteus.*	360,000	Heavy discharge on third day. Wound revised, ready for plastic repair in fifth week.	720,000
XI. Tibia	7 hours.	*Bacillus proteus.*	600,000	Foreign body removed third day. Secondary suture seventeenth day, but wound broke down five days later, healing by granulation tissue in 14 days.	480,000
XII. Tibia	5 hours.	*Staphylococcus aureus*, *Bacillus proteus*, *Pseudomonas pyocyaneus.*	360,000	Heavy discharge on third day. Wound revision performed. Discharge present, but lessening four weeks later.	960,000
XIII. Tibia	12 hours.	*Bacillus proteus.*	360,000	Heavy discharge on third day. Wound revision performed. Discharge present, but lessening four weeks later.	840,000
XIV. Tibia	10 hours.	*Staphylococcus aureus*, *Bacillus subtilis.*	240,000	Heavy discharge on third day. Wound revision performed. Discharge present, but lessening four weeks later.	600,000
XV. Patella ..	—	—	—	See Case II, Table II.	
XVI. Talus	9 hours.	*Staphylococcus aureus*, *Bacillus proteus.*	240,000 and 50,000 in ankle joint.	Bullet removed from talus two days later; discharge still present five weeks later, but in lessening amount. Joint not infected.	720,000 and 150,000 into joint.
XVII. Metatarsal ..	—	—	—	See Case III, Table II.	

which it may be seen that eleven infected wounds were still open at the end of five weeks. The organisms responsible are tabulated in Table IV. The commonest was *Staphylococcus aureus* (penicillin-sensitive) in a mixture with one or other of the Gram-negative bacilli (12 instances). There was only one streptococcal infection, which occurred in a wound infected before surgical treatment.

TABLE IV.
Organisms Present in Infected Wounds.

Organism.	*Staphylococcus aureus.*	*Bacillus proteus.*	*Streptococcus haemolyticus.*
Pure infection	1	4	—
Mixed with *Bacillus proteus*	7	—	—
Mixed with *Bacillus proteus* and *Pseudomonas pyocyaneus*	2	—	—
Mixed with *Bacillus coli*	—	—	1
Mixed with *Bacillus subtilis*	2	—	—
Total	12	4	1

Secondary Involvement of Neighbouring Joints

Apart from finger and toe joints, large joints were involved only six times—the knee joint three times, the shoulder, elbow and ankle once only. Treatment of the fracture itself is in no wise affected. The joint is aspirated at the original operation and 50,000 units of penicillin are injected into it. This procedure is repeated every second day until no further fluid is obtained, usually in one week. On an average, 150,000 units of penicillin were used locally in these joints. In two cases (Case II, Table II, knee, and Case XVI, Table III, ankle), superficial infection occurred, but the joints were unaffected.

Amputations.

Only nine immediate amputations were performed. The most serious was necessitated by a badly contaminated compound fracture of the humerus with complete division of the brachial artery and nerve trunks and gross soft-tissue and skin damage. Immediate primary amputation was performed at the fracture site, skin flaps being left open; 880,000 units of penicillin prevented infection by penicillin-sensitive organisms, but *Bacillus proteus* infection delayed closure of the flaps.

Eight immediate amputations of phalanges were performed because of gross destruction of bone and soft tissues. All wounds healed successfully by primary suture, 420,000 units of penicillin being used. Two fingers were amputated at the end of a month because of loss of function due to tendon destruction and joint ankylosis.

Conclusions.

1. The principles of treatment in compound fractures are, firstly, to save life, and secondly, to save the limb.

2. In order to hasten recovery and minimize secondary infection, the wound should be closed as soon as possible. Of the 126 wounds, 31 did not require excision and all healed by first intention, 31 were treated by primary suture with four failures, 30 were treated by delayed secondary suture with one failure, and 11 were treated by secondary suture, with two failures. Thus, 72 wounds were able to be sutured within one month of reception with seven failures, chiefly because of the onset of infection.

3. Twelve wounds were unable to be sutured in the first month after reception, chiefly because of the onset of infection and of skin loss.

4. Seventeen wounds were infected locally, six before and eleven after the original surgical excision. The chief organism was a penicillin-sensitive *Staphylococcus aureus* usually associated with Gram-negative, penicillin-resistant bacilli, and the cause was the continued presence of necrotic material. The local effects of these infections were to delay skin suture and plastic repair and to cause breakdown in some sutured wounds.

5. The efficacy of penicillin given parenterally is shown in that there was no case of septicæmia, severe sepsis or gas gangrene. Penicillin is only an adjuvant to surgical treatment, as it cannot combat necrotic material or eradicate bacteria from it, though it will prevent infection from spreading into the tissues.

6. "Monacrin" is shown to be efficacious in the local treatment of bone infection due to the pyogenic cocci and the penicillin-resistant Gram-negative bacilli.

7. Treatment of shattered tibiæ associated with skin loss is the greatest problem in gunshot wounds of bone. Of 17 fractured tibiæ, eight which were severely comminuted, became infected locally, and the wounds were still discharging five weeks after reception. The less severely fractured tibiæ associated with no great skin loss were more successfully dealt with, seven wounds being sutured early, and only one failure from secondary suture being recorded.

Summary.

A report of a series of 126 gunshot wounds of bones of the extremities is presented. The surgical treatment aided by the parenteral administration of penicillin and the local use of "Monacrin" is described, and the early results are given.

Acknowledgement.

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Reports of Cases.

A CASE OF ADDISON'S SUPRARENAL SYNDROME OF PRIMARY PITUITARY ORIGIN.

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Clinical Record.

MRS. T., a married woman, aged fifty-three years, was first admitted to the Royal Prince Alfred Hospital, Sydney, on February 23, 1945, in a condition of collapse. She stated that she had last felt well about fourteen years previously. Since then she had been troubled by a gradually increasing lack of energy, until now she persistently felt tired. Her skin was slowly becoming more deeply pigmented, and during the last six months she had suffered from attacks of severe and persistent vomiting accompanied by epigastric pain. She had eight children, ranging in age from sixteen years to thirty-four years. There was no evidence of tuberculosis in her family.

On examination of the patient, her skin was much pigmented, especially over those areas exposed to the sun. The mucous membranes of the mouth were also slightly pigmented. She was very emaciated. No abnormality was detected in the character or distribution of hair on her body, and no abnormality could be detected on palpation of the thyreoid gland. The systolic blood pressure was 110 millimetres of mercury, the diastolic pressure 75 millimetres, and the pulse rate was 65 per minute. Her temperature was normal. An X-ray examination of her lungs was made; and this revealed some shadows indicative of mild bronchitic changes, but there was no evidence of any tuberculous lesion.

A diagnosis of Addison's disease was made and the patient responded well to sodium chloride therapy. After three weeks her condition had improved considerably. A 200-milligramme pellet of desoxycorticosterone acetate was then implanted into her left rectus muscle, and she was allowed to go home. However, she returned five days later in a state of severe collapse. The systolic blood pressure was 94 millimetres of mercury and the diastolic pressure 68 millimetres, and her pulse rate was 85 per minute. She was given eschatin, an adrenal cortical extract, the dose to begin with being four millilitres, and being gradually increased up to 20 millilitres, which was given in one litre of saline solution. However, she failed to respond to this treatment, and died in a typical Addisonian crisis, twenty-two days after her admission to hospital.

A provisional diagnosis of Addison's disease was made.

Post-Mortem Examination.

A post-mortem examination was carried out eight hours after death by Dr. Elizabeth Himmelhoch, of the Royal Prince Alfred Hospital staff. The body was considerably wasted, the subcutaneous fat being scanty. In both adrenal glands atrophic changes were present. The left gland was about the size of a normal lymph gland; the right gland was almost completely absent, being represented by a small cystic mass. The pituitary gland consisted of a small piece of glandular substance adherent to the stalk. The thyreoid gland was pale, small and fibrotic, especially the left lobe. The parathyreoids were not seen. Both ovaries and the uterus were small and fibrotic. The stomach mucosa was thin, smooth and atrophic. The only abnormality found in the lungs was a fibrous scar at the apex of the upper lobe of the left lung. Macroscopic examination disclosed no abnormalities in the heart, liver, kidneys and pancreas.

Histological examination of the adrenals showed that the left gland had a thickened capsule. Normal anatomy and structure were completely lost. The cells were devoid of their normal lipoid content. Considerable lymphocytic infiltration was present. Fibrous stroma was increased and medulla was absent. In the right adrenal a severe degree of disorganization of the cells was found. Cortical tissue was almost completely absent. In this gland also pronounced lymphocytic infiltration and an increase in fibrous stroma were observed. Neither gland showed any evidence of tuberculous infection.

In the pituitary, only the anterior and middle lobes could be distinguished. The most striking feature was the almost complete absence of basophile cells in the anterior lobe, which consisted largely of chromophobe cells; these were large and swollen and contained pyknotic nuclei. There was no evidence of infarction.

In the thyreoid a pronounced excess of fibrous tissue was present separating the acini. The acini were much reduced in size and number and were lined with a low, inactive type of endothelium; they contained little colloid. The whole gland was densely and diffusely infiltrated with lymphocytes.

In the ovaries, most of the parenchyma had been replaced by fibrous tissue. There was no evidence of any *corpora lutea* or *corpora fibrosa*.

The apical scar in the left lung consisted of dense fibrous tissue surrounding a few atrophic bronchioles and alveoli. This may possibly have been a tuberculous lesion.

Discussion.

This condition falls amongst those clinical syndromes commonly classed as "pluriglandular". It has been clearly shown, however, that many of the functions of the various endocrine glands are primarily under the control of the pituitary gland, and that it is owing to alteration in the secretions of the many different hormones of this gland that the various types of syndromes arise.

In Cushing's syndrome a basophile adenoma of the anterior lobe of the pituitary is associated with hyperplasia and hypersecretion of the cells of the adrenal cortex, indicating that it is the basophile cells which secrete the corticotrophic hormone. On the other hand, in typical Addison's syndrome due to primary atrophy of the adrenal cortex, there is an increase in the basophile cells of the pituitary, which is probably of a compensatory nature. Thus there is undoubtedly a close relationship between the basophile cells of the pituitary and the cortical cells of the adrenal glands. In this case there was a considerable deficiency in the number of basophile cells in the pituitary, suggesting that the primary pathological change was hypoplasia and hypofunction of these basophile cells and that the atrophy of the cortical cells of the adrenals was secondary to this. As far as can be ascertained, no previous case has been recorded of Addison's syndrome associated with a pronounced deficiency of the pituitary basophile cells.

Sheehan[1] has investigated a number of cases in which the clinical diagnosis of Simmonds's cachexia was made and has found that in many of these cases necrosis of the pituitary gland was present, so massive as to suggest that it could have been caused only by occlusion of the main arterial supply to the gland. Sheehan has also obtained evidence of a severe post-partum hæmorrhage into the pituitary in a number of these cases, and so he has collectively termed them "massive post-partum necrosis of the pituitary". In the present case there is no evidence of a post-partum hæmorrhage with necrosis in the pituitary, although the possibility that this may have occurred cannot be excluded.

Castleman and Hertz[2] have reported that many cases in which the clinical diagnosis of Simmonds's cachexia is made are interrupted by severe crises, the main feature of which is a profound state of collapse, and they have suggested that these crises are in all probability due to a deficiency in the adrenal cortical hormone secondary to failure in the secretion of the corticotrophic hormone by the pituitary.

The explanation of the failure to respond to desoxycorticosterone acetate and eschatin is still obscure, but it is possible that some patients with the clinical diagnosis of Addison's syndrome who fail to respond to substitution

therapy have their primary pathological lesion in the pituitary gland. In this respect they would present an analogy with patients suffering from hypothyreoidism of primary pituitary origin who do not respond well to ordinary therapeutic doses of thyreoid extract.

Summary.

A case of Addison's suprarenal syndrome with pluriglandular atrophy and almost complete absence of the basophile cells of the pituitary is described. Evidence is presented that the atrophy of the adrenals was secondary to deficiency of secretion of the corticotrophic hormone of the pituitary.

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Reviews.

VENEREAL DISEASE.

The second edition of the "Handbook of Diagnosis and Treatment of Venereal Disease", by A. E. W. McLachlan, follows seventeen months after the first edition, and brings the publication up to date by including information concerning the use of penicillin in venereal disease.[1]

The volume maintains its conciseness and there is no change in the general arrangement of material. It has expanded by six pages and there is an additional coloured illustration showing acute gonorrhœa in the female.

False serological reactions likely to lead to an erroneous diagnosis of syphilis are discussed in greater detail in this edition, and the clinician is warned of the need "for the greatest caution before accepting as incontrovertible proof of syphilis, the sole evidence of an unexpected positive serological reaction".

"Neo-Halarsine" has been added to the list of trivalent arsenicals under the oxyphenarsine group and the dosage and arsenic percentage are given for bismuth acetarsol, and tryparsone bismuth in the arsenic bismuth compounds.

Intensive arsenotherapy has received greater consideration and descriptions of the twenty-day and seven-week courses have been added. The use of penicillin in the treatment of syphilis is mentioned briefly with the reservation that the optimum time dosage has not yet been finally determined. The course mentioned is a total of 2,400,000 Oxford units of penicillin given in doses of 40,000 Oxford units every three hours. Practice today requires at least a total of 3,600,000 Oxford units, and experience may show that even larger total dosage is required.

Reference is made to combined penicillin-arsenotherapy in which two injections of neoarsphenamine (0·45 gramme) and one of bismuth (0·3 gramme) are given during the course of routine penicillin therapy, and this is followed by a full unit course of neoarsphenamine and bismuth in the ensuing nine weeks.

It is well to remember that the use of penicillin alone in the treatment of syphilis has not yet been subjected to the test of time, and although an unknown number of syphilitic infections may have been completely overcome, the percentage of failures remains yet to be disclosed in the years ahead. McLachlan warns of "the absolute necessity for the most careful observation over a minimum period of two years and examination of the cerebro-spinal fluid ten to fourteen days after the completion of treatment". Clinical and serological examination is recommended monthly for the first year following on penicillin treatment and at periods of three months during the second year.

In the section dealing with gonorrhœa, reference to the gonococcal complement fixation test has been expanded. While insisting that in tests of cure "a persistently positive reaction indicates the necessity for the most thorough clinical and bacteriological investigation to detect any latent focus", the author further states that cure may be safely assumed despite a continued "positive complement deviation test" if these other investigations are consistently "negative" over a period of six months. This statement may be considered applicable only to the male patient by many who have had long experience with infected females, and some may not be prepared to accept it even for males.

In the section dealing with the incision of a periurethral abscess by aid of a urethroscopic tube, the advice has been added to relax any air dilatation of the urethra before free incision so as to obviate any risk of air embolism.

In regard to bacteriological examination of females it is pointed out that "provisional exclusion of gonococcal infection should not be assumed until after a series of three to five negative tests have been obtained over a period of fourteen days", and that "complete exclusion necessitates observations over a period of three months". This need for careful investigation cannot be too strongly emphasized.

Throughout this new edition the references made to penicillin are brief, and a chapter dealing in greater detail with its uses would, we think, be a further improvement in an excellent little handbook. The volume may be recommended with confidence to those who seek a clear yet concise guide to the diagnosis and treatment of venereal disease.

[1] "Handbook of Diagnosis and Treatment of Venereal Disease", by A. E. W. McLachlan, M.B., Ch.B. (Edinburgh), D.P.H., F.R.S. (Edinburgh); Second Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 7¼" x 5", pp. 379, with many illustrations, some in colour. Price: 15s. net, postage 7d.

OUTLINES OF PHYSICAL THERAPY.

"Outlines of Physical Methods in Medicine", by G. D. Kersley,[1] is no more than the title implies, but nevertheless this little book has a wealth of information in its eighty-five pages. That the author has had an extensive experience in the use of physical aids in treatment is shown by the practical manner in which he describes the various procedures. The various types of electrotherapy are discussed at some length and the different circuits used are illustrated clearly. The chapter on remedial exercises for the various joints and muscle groups is excellently written. Occupational therapy, which is so often glossed over, is also dealt with fully and the most suitable activities for the different disabilities are listed. It is pleasing to see that the value of occupational therapy, especially for sufferers from chronic illnesses, is being appreciated. As stated in the foreword, the book serves to emphasize the importance of cooperation between doctors and masseuses if the patient is to derive the utmost benefit from treatment. All concerned with the use of physical therapy will value this work for its many practical suggestions.

SURGICAL PATHOLOGY.

Despite the obvious difficulties of the past few years there has been produced another edition of "A Text-Book of Surgical Pathology".[2] It differs in no way from preceding editions in its clarity, its mature and considered opinion, and its authoritative teaching. All the important contributions of the last four years to surgical pathology have received their due place. Naturally, therefore, recent experiences of war surgery have influenced the opening chapters so that the shock syndrome, anaerobic streptococcal cellulitis and myositis and allied topics are considered. It is disappointing to find that liver necrosis is not mentioned in the section on burns, although this may have been accepted as due solely to tannic acid.

The total amount of new material in the book is not great. There is no undue emphasis on new and rare diseases. Yet throughout it is obvious that recent literature has affected most sections. There is a small but adequate bibliography at the end of each chapter.

[1] "Outlines of Physical Methods in Medicine", by G. D. Kersley, M.A., M.D., F.R.C.P.; 1945. London: William Heinemann (Medical Books) Limited. 7¼" x 5", pp. 95. Price: 6s. net.

[2] "A Text-Book of Surgical Pathology", by Charles F. W. Illingworth, M.D., Ch.M., F.R.C.S. (Edinburgh), and Bruce M. Dick, M.B., F.R.C.S. (Edinburgh); Fifth Edition; 1945. London: J. and A. Churchill Limited. 9¼" x 6", pp. 736, with 306 illustrations. Price: 42s.

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"THE STORY OF A GREAT ACHIEVEMENT."

To say that the war of 1939-1945 was won not only on the battlefield, on the sea and in the air, but also in the workshops and factories of the allied nations, is to say something that has been unmistakably evident. It is, however, a remark that must be repeated just now for several reasons. The first is that everybody in this country and doubtless in others does not realize the magnitude of the task that Britain had to face, the way in which the people as a whole put all that they were and all that they had into the job of winning, the cohesion shown by them and their allies and the enormous war weapon that they forged to force victory from the hands of a resolute enemy. The second reason for repetition has to do with rehabilitation, that word which falls so easily from our lips. The greater the dislocation of social life needed to win the war, the more difficult will be the return to life lived on a peace-time basis. Sailors and soldiers and airmen are not the only members of the community who have to readjust their activities of mind and body now that the war has ended. The Britisher is not given to blowing his own trumpet, but there is every reason why the world at large should know what Britain accomplished in her highly geared war-winning effort. *The Times*, of London, has tried to tell the world in a special "Record of British War Production", a thirty-two page publication in the format of the everyday edition of *The Times*. The Right Honourable Oliver Lyttleton, who was Minister for Production from March, 1942, to July, 1945, in a foreword points out that in the record there is collected together for the first time in one document a comprehensive summary of the many and varied aspects of Britain's achievement in war production. It would be quite impossible to summarize this summary, but at the risk of telling some of our readers what they already know, we propose to mention some of the more important facts. This may help those who, in the language of the prophet, seeing see not, and hearing hear not, neither do they understand. Those who do not understand include those who will not understand because their heart is "waxed gross". Those who do know and understand may welcome a restatement of some of the facts; they would certainly find the "record" set out by *The Times* of the most absorbing interest.

In September, 1939, Britain was woefully unprepared for war, but in the early summer of 1940 when most of her "small and painfully built up stocks of military equipment" lay burnt or captured in Belgium, the challenge was still more dreadful. Britain then stood alone against a fully mobilized Germany. Her people were almost unarmed, she was isolated by the collapse of her Continental allies, her economy was not really geared for war, and she was threatened with the cutting of her sea lifelines. The picture on "D Day" was very different. In the interval between these two events British industry and the British people "through deprivations voluntary and forced, through compulsion and direction cheerfully and willingly borne, and through unprecedented hours and intensity of toil, became totally harnessed to the service of total war". This is no abstract form of words. There was no individual of either sex of working age—and few of those beyond normal working age—whose work was not consciously sanctioned or directed as his or her most valuable contribution to the nation at war. After the most careful examination of all the facts in all countries, it is claimed for the British people that they were more fully deprived of their peace-time comforts and more fully mobilized for war than the people of any other country, not excluding Germany. All men up to the age of sixty-four years and all women up to the age of fifty-nine were mobilized. This meant that there was a huge transference from the home and from both voluntary and involuntary unemployment to industrial and war work of some kind. The number of men and women below the ages mentioned engaged in industrial employment or in the services increased from 18,500,000 in the middle of 1939 to 22,000,000 in the middle of 1944. (In this calculation two part-time workers count as one whole-time worker.) The forces, the whole-time Civil Defence and the women's auxiliary services claimed 550,000 in 1939 and 5,250,000 in 1944. The number of persons employed on munitions work rose from 1,150,000 in 1939 to 4,300,000 in 1944. In 1938 only 6% of the national income was devoted to "defence" expenditure; in 1939 the figure was about 14%; in the early summer of 1940 the nation's economy was still only about 20% mobilized for war; four years later, at the time of "D Day", 55% of a greatly increased national income was applied directly to the war effort. The national income was increased not only by the greater number of workers, but also by the longer hours that were worked. The average hours of work for men engaged in the production of munitions, for example, rose from 48 hours a week before the outbreak of war to 54 hours early in 1944. One result of intense work in the war-time factories and in the services was the disappearances of all luxuries. They were not to be had because they were simply not being made. Even the ordinary equipment of life was heavily curtailed and food suffered along with the rest. It may be useful to remind Australian readers of the average civilian consumption per head per week during 1943 of the following foodstuffs: butter, 2·34 ounces; fresh eggs, 1·45;

fresh meat, 22·18 ounces; bacon and ham, 5·78 ounces; fresh fish, 4·56 ounces; sugar, 20·00 ounces; fresh fruit, 12·06 ounces. The changes in 1944 and 1945 were only slight.

Since European history began, we are told, Britain, faced by the substantial populations and conscript land armies of the Continent, has found her greatest strategical problem in manpower. It is therefore not surprising that throughout the war years "manpower was the dominating shortage which conditioned the programme". There were times when shipping troubles seemed likely to cause exhaustion of certain materials, but in the end the human "bottleneck" was the only one which really determined the limits of output. At the same time nothing was ever urgently wanted which remained unmade as long as there was a man or woman to make it. With the import of raw materials cut by 50%, there was achieved the highest industrial output ever attained in the history of the country. Let us look at some of the things that were done. Of all the munitions used by the armed forces of the British Commonwealth and Empire (8,750,000 men in all) since the beginning of the war, no less an amount than 70% was produced in the United Kingdom itself. The rest came from the United States of America, Canada and the other nations of the Commonwealth. This aid from overseas incidentally was indispensable. In addition to what was produced for British forces and for those of the Commonwealth and Empire substantial supplies were made for and sent to allies—the United States forces in Britain, the U.S.S.R., China and others of the United Nations. The figures for some of the biggest items in output give a general picture. In a table are set out for purposes of comparison the annual production rate during the last quarter of 1939 and at the war peak. Since bare figures for increases are "too astronomical" to convey much, we shall content ourselves by setting out the annual output of certain items at the war peak: machine guns, 104,800; sub-machine guns, 1,572,000; tanks, 8,600; tanks (weight in tons), 208,140; carriers and armoured cars, 24,400; shells, 59,400,000; small arms ammunition, 3,046,000,000; army wireless stations, 193,000; major war vessels, 346,000 tons; mosquito and other naval craft, 235,000 tons; naval guns, 20,970; aircraft, all kinds (structure weight in millions of pounds), 223; bombs, 458,000 tons; aero engines, 63,300; aero engines repaired, 45,400. Several special advances must be mentioned. Britain was the pioneer in radar and in jet propulsion. A British scientist discovered penicillin. A British engineer invented and designed the Bailey bridge—a bridge whose girders are built up of prefabricated panels which can be erected in various combinations to give varying strength. Britishers designed and built the Mulberry harbours, the prefabricated portable harbours which made the invasion of France possible. Appealing to the imagination, as much as anything perhaps, was "Pluto" (pipe line under the ocean), the system of pipes across the English Channel designed to meet the enormous demands for fuel oil by the invading armies after D Day. A book of no mean size might be written of steel production in Britain during the war. The handicaps in this, as in every other, industry were enormous. Steel of various kinds was needed and a great deal of laboratory research and experiment had to be carried out with alloys of different kinds, but this need be no more than mentioned. The iron and steel industry produced and handled during the war a grand total of no less than 86,000,000 tons of steel. Of this amount 14,000,000 tons were imported and the rest was manufactured at home. The industry mined and used 101,000,000 tons of iron ore and approximately 5,000,000 tons of scrap were obtained from three great scrap collections. During the period the statistics covering the relationship of demand against supply show that in 1941 deliveries met 92·6% of allocations, in 1942 96·1%, and in 1943, the highest consuming year, 100·8%; for 1944 the figure was 98·1%.

Reference must be made to food production in Britain. Before the war Britain produced only 40% of the food required to meet her needs; for the rest she relied on Canada, Australia, New Zealand and South America. At the end of the war she was able to meet 70% of her needs. From the amounts of food already quoted as comprising part of the ration it is clear that people had to be content with bare necessities and with a diet balanced on scientific standards with little regard for the preferences of the consumer. The United Kingdom is naturally a grass country. An acre of permanent grass, we are told, feeds only one or two persons; but when that acre is ploughed and sown with wheat it feeds twenty; planted with potatoes it feeds forty persons. The United Kingdom has altogether a total of 32,000,000 acres of arable land, given over to crops and grass. At the beginning of the war the land under cultivation had fallen as low as 13,000,000 acres. This was the lowest ploughed area ever recorded and was 2,000,000 acres less than the area under cultivation at the start of the war of 1914-1918. As early as May, 1939, the Minister of Agriculture offered to farmers a grant of two pounds an acre towards the cost of ploughing up permanent grass lands. Steps were also taken to increase the home manufacture of tractors and farm machinery. Between May and the outbreak of war in September, 350,000 acres of grass land had been ploughed and prepared for grain bearing. This presumably is the "flying start" that is credited to the Ministry of Agriculture and the farmers at the outbreak of war. The first thing that was done by the Minister when hostilities started was to set up war agricultural executive committees in the 61 counties of England and Wales. These committees acted as the local agents of the Minister; they had technical staffs to deal with technical problems and they dealt with other problems such as those of labour and machinery. They also had the great advantage of local knowledge. As a result of the work of these committees more than 7,000,000 acres of arable grass land have been put under cultivation and have yielded good crops. One of the chief concerns of the committees has been the increase of the milk supply. Attention has been drawn in these columns from time to time during the war to the excellent arrangements that were made to supply milk to women and children. We read that, though siege conditions no longer exist, dairy products, meat and eggs are scarce in the world, and Britain will for some years to come need all the home production that she can get.

One further group of facts remains to be mentioned. It has to do with mutual aid to allies. The estimated value of goods, services and capital facilities provided by His Majesty's Government in the United Kingdom to allies up to March 31, 1945, exceeded £1,400,000,000. This mutual aid was continued after that date without payment in furtherance of the principle that the resources of the

United Nations should be pooled for the common war effort. The records are not complete. The following are the amounts of mutual aid to all countries on the basis of the latest recorded figures. (Except as otherwise stated, the figures are cumulative to June 30, 1944.) United States of America, £942,155,000 (up to March 31, 1945); U.S.S.R., £269,457,000; China, £9,050,000; France, £13,600,000 (up to June 30, 1943); Poland, £120,000,000 provisionally); Greece, £12,368,000; Czechoslovakia, £18,629,000; Portugal, £11,133,000; Turkey, £20,681,000. It is well also to remember that a great deal of this aid was given at the cost of many British lives and of an enormous amount of British equipment; these details possibly we shall never know.

In a small section at the end of the "record" reference is made to production in Australia, South Africa, Canada, New Zealand, India and the colonies. With this we do not propose to deal. Our object has been to emphasize Britain's vigour, her fortitude, her cohesion and her superb vitality. All the peoples of the Empire do well to ponder on the indubitable fact that had Britain not been as faithful and as valiant as she has always been, they would even now be captives of a foreign power and slaves of its bestial system. From this must arise some thought of Britain's present plight in the matter of food. Australia is among the well-favoured countries of the earth in her foodstuffs. She is doing something to help the Mother Country, but she could do more, and many of her citizens (most of them, we believe) would applaud any government action in this direction.

Current Comment.

MURMURS FROM TURBULENT FLOW.

THE difference between turbulent flow and streamline flow in pipes has given the engineer and physicist some pretty problems demanding mathematical analysis of no mean order. This difference has not always been kept in mind in animal physiology; for example, in one very learned and deservedly commended textbook the formula for the flow of blood in arteries was that pertaining to turbulent motion which in ordinary circumstances does not exist. To the physiologist turbulence denotes loss of energy; to the clinician it is of commanding interest as the cause of murmurs. In the placid flow of blood in veins we should naturally expect a streamline character, and this is the rule except in special cases such as in the "*bruit de diable*" associated with the internal jugular. P. F. Hahn, W. D. Donald and R. C. Grier, junior, injected radioactive phosphorus, of course in phosphate form, into the splenic vein of the dog and found the tagged element mostly in the left side of the liver; when it was injected into the mesenteric veins radioactivity was mostly detectable in the right side of the liver; but if the jugular vein was the seat of injection, then equal distribution of the "tracer" phosphate was discovered throughout the whole hepatic substance.[1] Apparently the blood in the splenic vein and that in the superior mesenteric behave like the water in the Rhone and Arve below Geneva. That the blood flow in the aorta is streamlined was enunciated by Hess in 1917, who based his opinion on the absence of any murmer detectable by a sensitive stethoscope.[2] This was then subjected to experimental proof; a viscous solution of methylene blue was forced into the aorta by injecting it with excess pressure into a carotid. Had the aortic stream been turbulent, the dye would have been evenly distributed throughout the blood taken from a femoral artery; but it was not, being in fact confined to discrete filaments. Ralston and Taylor[1] have recently improved on Hess's technique by inserting a thin-walled glass tube, 2·6 cubic millimetres long and 0·2 cubic millimetre internal diameter, into certain arteries of the heparinized dog and cat, and then, taking a hint from a classic engineering research by Reynolds,[2] injected Indian ink into the descending aorta by a needle orientated in the direction of the movement of the stream or actually into the left ventricle itself. The results amply confirmed the work of Hess.

Theoretically the moving column of blood in a vessel may be considered, when turbulence is absent, as a number of hollow cylinders, not infinite, as is sometimes erroneously suggested, for if the blood vessel contains plasma only the minimum thickness of the wall of each cylinder will be the diameter of the globulin molecule, but when erythrocytes constitute half the mass of the blood the possible number of such hollow cylinders is still smaller. The layer of blood in contact with the vessel wall is to all intents and purposes static, whereas the axical velocity is the greatest. Hence a substance of equal viscosity, carefully injected, will present a parabolic front if the flow is non-turbulent. This phenomenon the investigations mentioned have disclosed.

There is little doubt that considerations of turbulent contrasted with laminar flow explain much detail in the form and arrangement of arteries; take, for example, the cosine law of arterial branching which tells us that when the branch is very small it will come off at a right angle from the parent trunk, but on the other hand the larger the branch, the more acute will the angle be. The great practical and clinical consideration is, as stated, that turbulence produces murmurs. Valvular aberrations in the heart are so well known that a mere mention will suffice. The Korotkov sounds heard during the estimation of human arterial blood pressure depend on turbulence arising from the armlet. Dilatation of the pulmonary artery close to the semilunar ring is a recognized source of functional murmurs. Apparently in some symmetrical aneurysms turbulence may be almost absent, but in others it is pronounced. When the systolic wave in the pulse is exceptionally high and steep, as in aortic regurgitation, it travels faster than the main pressure wave and "breaks", throwing the artery into violent perturbations causing turbulent flow. A last point is this: the whole hæmodynamic system is based on the transport of an aqueous fluid with a viscosity slightly above five times that of water. Should that viscosity be lowered in any way, for example, by diminution of the number of corpuscles or a reduction of the percentage of proteins, then turbulence in flow may easily arise and this the stethoscope will reveal.

[1] *American Journal of Physiology*, Volume CXLIII, 1945, page 105.
[2] *Pflüger's Archiv*, Volume CLXVIII, 1917, page 439.

TICK PARALYSIS.

THAT ticks feed on man as well as on animals is widely recognized; that man may, like animals, die from paralysis following such an event may not be so keenly appreciated. Yet this is so. An opportunity to bring the subject forward has arisen by the publication of a critical review of tick paralysis by J. B. Stanbury and J. H. Huyck, both medical officers of the United States Navy.[3] Australia is one of the countries favoured by the tick and the species that affects man in Australia is *Ixodes holocyclus*. A good deal of work on tick paralysis has been done in this country and some fatal cases of tick paralysis in man have been reported in this journal. In October, 1924, E. W. Ferguson reviewed a number of deaths following tick paralysis in human beings. In all of the cases but one paralysis was present; in some the legs were affected most and in several respiratory paralysis was the immediate

[1] *American Journal of Physiology*, Volume CXLIV, 1945, page 706.
[2] *Philosophical Transactions of the Royal Society* (London), Volume CLXXIV, 1883, page 935.
[3] *Medicine*, September, 1945.

cause of death. In the case in which paralysis was not present the early history was not available. The ages of the patients varied from thirteen months to thirteen years. In April, 1930, C. W. Sinclair reported a fatal case in a child, aged three and a half years, in which paralysis was widespread involving even the *sphincter ani* and the muscles of deglutition. In the issue of June 1, 1940, D. G. Hamilton reviewed six cases that had occurred at the Royal Alexandra Hospital for Children; two of the six were fatal. Hamilton's paper will be found to be a useful statement on the condition.

Stanbury and Huyck give a good clinical picture of the ailment. The patient, usually a young female whose hair conceals a tick, is perfectly well before retiring on the evening prior to the onset of symptoms, but notices on rising the following morning that her legs are weak. Locomotion is possible at this stage, and temporary recovery or progression of the disease may occur from this point. When power or locomotion is lost, there is a rapid progression of ascending paralysis during the next twenty-four to forty-eight hours to a point at which the patient is unable to move either arms or legs and lies quite helpless. Sphincter function may or may not be retained. Except for possible apprehension the patient appears quite well. Vertigo or numbness and paræsthesia of the extremities may be present. The temperature rarely exceeds 100° F. until the terminal stage. Vomiting occurs occasionally and the patient may complain of stiffness of the extremities, restlessness, fatigue, aching legs and photophobia. Respiratory distress may begin quite suddenly and unexpectedly; when it does it usually leads to a fatal termination. Death may be preceded by convulsions. The mechanism of death is by respiratory paralysis. Typically, ascending paralysis with bulbar involvement is followed by death unless the tick is found and removed. Stanbury and Huyck have found no report of a case in which the patient recovered and the tick was found after recovery. If the tick is removed, considerable improvement occurs as a rule within a few hours. In America, unless the tick was found when the patient was *in extremis*, recovery has been invariable. Stanbury and Huyck point out that the disease as it occurs in Australia is different from the North American disease in several respects: the patients appear to be more acutely ill; the height of the disease is not reached until forty-eight hours after the tick has been recovered; *Ixodes holocyclus* is always the offending tick; recovery may require weeks; bizarre signs and symptoms are commoner. Stanbury and Huyck are at a loss to explain the differences shown by the condition in the two countries. They remark that in a few clinical reports symptoms are found to persist to such a degree as to suggest that the cases might be bacterial or viral in nature. They make no suggestion regarding the possibility that the differences may be due to a difference in the kind of tick concerned or in its habits and so on. That this is possible is shown by work carried out some years ago by I. Clunies Ross at the F. D. McMaster Animal Health Laboratory, Sydney, and reported by him in outline in 1935.[1] In view of the fact that the salivary glands of the tick undergo great enlargement during the final stages of engorgement, Ross tried to determine whether the toxic principle was present in the salivary secretion. He dissected numbers of five-day ticks which had gorged on dogs and he emulsified the salivary glands. He found that it was possible to obtain a solution which, if injected into white mice, would regularly produce fatal results and characteristic symptoms of tick paralysis. He found also that it was possible to determine the mouse minimum lethal dose of the pooled salivary emulsion as the equivalent of two and a half to three glands. Ross then tried to determine whether the fact that paralysis did not occur before the fifth day was due to quantitative forces or to some qualitative change which occurs in the secretion during the later stages of engorgement. Large numbers of three-day and four-day ticks were dissected and it was found that by increasing sufficiently the number of glands injected, fatal results could be obtained with salivary emulsion of ticks of both ages. Ross concluded, therefore, that the onset of paralysis was determined by quantitative rather than qualitative factors.

Stanbury and Huyck contrast the complexity of the ætiology of tick paralysis with the simplicity of treatment which for the most part consists in the removal of the tick, that is, if the tick is discovered before the condition has become far advanced. It is this fact which has led investigators to regard the disease as caused by a toxic agent formed in the tick and injected into the host. Stanbury and Huyck state that this is the most ready explanation. This toxin, in their opinion, might be formed within the tick ova and be diffused into the salivary glands, it might be found within the salivary glands, or it might be formed elsewhere and be activated by the salivary glands. Which of these possibilities is correct remains to be proved. In the meantime it is safe to conclude that a specific bacterial, viral or rickettsial agent is not responsible. The treatment and prophylaxis of tick paralysis must be left for consideration on another occasion.

[1] *The Journal of the Council for Scientific and Industrial Research*, February, 1935.

JEAN-PAUL MARAT: VISIONARY OR VILLAIN?

On May 24, 1743, was born at Boudry, Neuchâtel, one Jean-Paul Marat, who was destined to become one of the ornaments of the medical profession. Whether the ornament bears more resemblance to a horrifying gargoyle or to some object of beauty like the Winged Victory seems to depend entirely upon the point of view of the historian. Marat's biographer in "The Encyclopædia Britannica" inclines to the latter view,[1] while C. MacLaurin, in a short study, firmly holds to the former.[2] "Cross benches" is held by H. P. Bayon in a lecture delivered before the Section of the History of Medicine of the Royal Society of Medicine in November, 1944.[3] Bayon has concentrated particularly on the medical aspects of Marat's career. There seems to be fair agreement among biographers about events in Marat's early life, although differences in detail appear. Jean-Paul was the son of Giovanni Mara, a native of Sardinia and an artist or designer and teacher of languages, and of his wife Louise Cabrol, of Geneva, the daughter of a wig-maker. In 1759, at the age of sixteen years, Marat left home and went to Bordeaux; according to "The Encyclopædia Britannica" this was on the death of his mother, and he went to Bordeaux and studied medicine for two years; Bayon states that Marat went to Bordeaux and became tutor to a family there; MacLaurin agrees that he studied medicine. Marat went to London in about 1766, and it was there, in 1773, that his best known work appeared; this was a "Philosophical Essay on Man", but Bayon refers to it as "An Essay on the Human Soul", and puts the date of its publication as 1772. In this essay Marat attacked the teaching of Helvetius that a knowledge of science was unnecessary for a philosopher. He declared that physiology alone could solve the problems of the connexion between the soul and the body. He suggested that the nerves carried two fluids, one sensory and the other motor, and stated that when a nerve was tied, sensation and motility ceased. He placed the soul in the meningeal membranes. Marat also suggested that hunger and thirst should be added to the five senses. Bayon states that Marat was a keen scientific experimenter during most of his life; he was interested in heat, light and electricity, and wrote works on those subjects. In 1775 Marat was in Edinburgh, where he received the degree of doctor of medicine of the University of Saint Andrews. Bayon reminds us that it was of this university that Dr. Samuel Johnson said that it had become wealthy by degrees. Back in Paris in 1777, Marat achieved considerable fame by his treatment of Madame de Laubespine, who was suffering from phthisis; she apparently recovered, and

[1] "The Encyclopædia Britannica", Fourteenth Edition, Volume XIV, page 855.
[2] C. MacLaurin: "Post Mortem: Essays, Historical and Medical", 1923.
[3] *Proceedings of the Royal Society of Medicine*, November, 1945, page 39.

was alive four years later. Bayon thinks that the patient may have had one of the unexplained remissions that characterize pulmonary tuberculosis, and that Marat's expectant treatment (he did not use antimony, bleeding or other fashionable remedies) gave the *vis medicatrix naturæ* a chance to improve her health. Comparison of Marat's prescriptions with those of other physicians of his time show him to have been a "simplicist"—he relied on simple substances in treatment. Whatever the reason for his success in the case of Madame de Laubespine, it was the cause of his being appointed by the Comte d'Artois (later Charles X of France) as physician to his guards. (Some commentators consider that in this appointment Marat was no more than a horse-leech.) This appointment ended in 1784.

In the years before Marat finally abandoned the practice of medicine and the pursuit of science for a political career, he wrote a number of essays on medical subjects. Bayon also refers to an incident which he says is denied by the majority of Marat's biographers—a theft from the Ashmolean Museum, Oxford, followed by an enforced sojourn in the hulks at Woolwich. In 1783 appeared his last medical writing—"*Mémoire sur l'électricité médicale*". Bayon considers this his best piece of work; it is chiefly concerned with contesting the effects of electricity on different diseases. Several of Marat's "tracts" are in the nature of case reports, and if they make no great contribution to the pathology and treatment of the conditions discussed, they at least suggest that he may have obtained good results by scrupulous care. Two incidents are of interest from the point of view of Marat's later activities. In a letter to a Mr. William Daly, of which the date is unknown, Marat stated that his heart was "as tender as yours" (the subject under discussion being the anatomical observation of animals). In another letter Marat declined to perform an autopsy, for the reason that his feelings would not allow him "*d'assister à l'ouverture du corps d'un ami*". All this is very quaint, in view of the unenviable reputation which Marat later earned for himself during the Reign of Terror as a citizen with an insatiable thirst for blood; "his most glorious vision", according to MacLaurin, "was only of killing 300,000 daily", but he never succeeded in reaching this total.

With the outbreak of the French Revolution in 1789, Marat's political career began. His biographer in "The Encyclopædia Britannica" paints of him what must be an idealized portrait; he describes Marat as always standing alone, suspecting anyone who was in power, yet always meaning what he said, and constantly crying "*Nous sommes trahis!*" We gain the impression, through all the violence and vehemence of what Marat published in his paper, *L'Ami du peuple*, and of his own actions, that his was an unselfish interest in the future welfare of the people. This, however, is not the opinion of MacLaurin:

> His policy was simple, and touched the great heart of the people. "Whatsoever things were pure, whatsoever things were of good repute, whatsoever things were honest"—so be it that they were not Jean Paul Marat's, those things he vilified . . . . By his violent attacks on every one he made Paris too hot to hold him, and once again retired to London.

Back in Paris, Marat had to hide in cellars and sewers, and he himself said that it was here that he contracted the skin disease affecting the groin and scrotum from which he suffered for the rest of his life. All authorities agree that he could obtain relief from the intolerable itching only by sitting in a bath of hot water. Opinions differ as to the nature of the disease; the biographer of "The Encyclopædia Britannica" offers no suggestion; MacLaurin states that modern writers consider it likely to have been *dermatitis herpetiformis*, though Marat's political friends thought it the result of the humours generated by excessive patriotism in so small a body; Bayon, after careful thought, has come to the conclusion that the condition was chronic scabies. Whatever the disease may have been, it certainly caused Marat to spend most of his time in a hot slipper bath, and he was certainly in that situation when Charlotte Corday at last succeeded in gaining entrance to his room on July 13, 1793. MacLaurin gives an attractive description of this heroic young woman, determined to rid her country of what to her was a loathesome creature:

> Perhaps it would hardly be respectful to call her an "intense" young lady; but there was a young lady who sometimes used to consult me who might very well have sat for the portrait; she possessed a type of somewhat —dare I say?—priggish neurosis which I imagine was not unlike the type of character that dwelt within Charlotte Corday—extreme conscientiousness and self-righteousness. Such a face might have been the face of a Christian martyr going to the lions—if any Christian martyrs were ever thrown to the lions, which some doubt.

Having told Marat that a number of Girondins at Caen were plotting against the Revolution, Charlotte Corday heard him say: "Their heads shall fall within a fortnight." She thereupon plunged the long knife that she had brought with her into his right subclavicular space; it penetrated the space between the first and second right ribs, transfixed the lung, went through the aorta and entered the left auricle. Bayon calls attention to the fact that *post mortem* the whole surface of the right lung was found adherent to the pleura, so that at some time Marat must have suffered from pleurisy. Charlotte Corday, as everyone remembers, paid for her deed with her life.

This brief and inadequate account of Marat's career will serve as a further example of how the judgement of posterity may be swayed by the human element in historians. According to MacLaurin, Marat was a villain of the deepest dye, a human being who was little better than a beast, possessor of an "ill-balanced mind". Marat's biographer in "The Encyclopædia Britannica" takes of him, if we are to judge by historical facts, rather too sympathetic a view. (And yet, what are "historical facts" at a distance of a century and a half?) Bayon's carefully documented and reasonable study seems likely to be nearer the truth. He holds that those who believe that Marat was a madman are considering only the last three or four years of his life, "when many of his utterances were those of a homicidal maniac". No insanity was obvious in any of his close relatives—father, mother, brothers and sisters.

> It is true that Marat fulfilled one of the conditions for certification; he was a danger to his surroundings, for he could inflame the base passions of the populace so that they resorted to bloodshed and plunder. But it should not be forgotten that until he became cognizant of his power of swaying the mob, he behaved sanely, if somewhat morbidly.
>
> His egotism was not greater than that noticeable in the autobiographies of Benvenuto Cellini or Giacomo Casanova . . . . His "delusions of persecution"—as Burr calls them—though exaggerated, were not figments of the imagination . . . .

With regard to Marat's medical career, Bayon concludes that not in his methods, outlook or recorded writings can he be considered a "quack"; Dr. Marat's medical practice "seems to have followed orthodox paths".

THE MEDICAL ANNUAL.

"THE MEDICAL ANNUAL" for 1945 is sure to be welcomed by practitioners.[1] It is the sixty-third consecutive volume of a series and bears, like its predecessors, the appropriate title of "A Year Book of Treatment and Practitioner's Index". In previous years we have referred to "The Medical Annual habit"—once the book becomes known to a practitioner he acquires the habit of turning to it for information and the habit sticks. Among the more useful articles in this volume may be mentioned those on scrub typhus, stilbœstrol in cancer, tropical eosinophilia, the use of sulphonamides in dermatology and infective hepatitis. There is a good review of penicillin and its uses and the section on tuberculosis is worthy of attention. A contribution on vital statistics is an innovation and calls attention to an important branch of study.

[1] "The Medical Annual: A Year Book of Treatment and Practitioner's Index", edited by Sir Henry Tidy, K.B.E., M.A., M.D. (Oxon.), F.R.C.P., and A. Rendle Short, M.D., B.S., B.Sc., F.R.C.S.; 1945—sixty-third year. Bristol: John Wright and Sons Limited. 8¾" × 5¾", pp. 422. Price: 25s. net.

Abstracts from Medical Literature.

THERAPEUTICS.

Penicillin.

C. S. KEEPER (*The American Journal of the Medical Sciences*, August, 1945) discusses the uses of penicillin. The average doses required in gonorrhœa are 50,000 to 150,000 units. These will effect a cure in 98% of cases in twenty-four hours. Hæmolytic *Staphylococcus aureus* requires 100,000 to 200,000 units daily for one to three weeks or more. *Streptococcus viridans* endocarditis needs at least 300,000 units daily for two to three weeks. Bacteriæmia due to *Staphylococcus aureus*, *Streptococcus hæmolyticus* or pneumococcus requires 120,000 to 240,000 units a day. The results are best in early cases in young people, less favourable in fulminating or prolonged infections and in elderly persons. Meningococcus meningitis is best treated with sulphadiazine. If no response occurs in twenty-four to forty-eight hours with sulphonamides, penicillin given both systemically and intrathecally is advised. Pneumococcal, staphylococcal and hæmolytic streptococcal meningitis is best treated with penicillin. Foci of infection such as mastoiditis should be drained surgically at the same time. In pneumococcal meningitis combined sulphadiazine and penicillin may be preferred. *Otitis media* and mastoiditis respond well to penicillin, as does tonsillitis due to *Streptococcus hæmolyticus*. Continuation of treatment for five to seven days is advised. For pneumococcal pneumonia penicillin is advised when response to sulphadiazine is unsatisfactory or when dangerous or worrying complications are present; 60,000 to 120,000 units a day intramuscularly may be required, and penicillin should be continued for two or three days after the fever has subsided. In acute osteomyelitis 120,000 to 250,000 units are given per day for two or three weeks until all clinical signs and symptoms have ceased. Gas gangrene requires surgical removal of necrotic and damaged tissue, antitoxin and penicillin in the usual doses for three to ten days. Treatment of syphilis is still in the experimental stage. Toxic reactions include fever, malaise, headache, increase of rash, painful swelling of the primary lesion or of the regional lymph nodes. These reactions do not contraindicate the continuance of treatment. Toxic reactions of penicillin in other disorders may take the form of urticaria at any stage; vesicular eruptions and thrombophlebitis may occur in intravenous therapy. A low fever may persist after clinical symptoms and signs have disappeared, and the fever subsides when penicillin is suspended. Abdominal cramps, diarrhœa, nausea and vomiting have been recorded. Actinomycosis, anthrax, yaws and rat bite fever due to *Streptobacillus moniliformis* have been said to respond to penicillin. Clinical diphtheria should not be treated with penicillin in preference to antitoxin, but penicillin may help in toxic cases. It is not effective for carriers. Chronic sinusitis, ear infections and nose and throat infections, as well as gingivitis and stomatitis due to Vincent's organisms, are not proved to respond to penicillin. In prophylaxis the value of penicillin is doubtful, though it has been said to diminish the incidence of empyema if given for one week before and after lobectomy and pneumonectomy.

U.F.I.

C. P. G. WAKELEY AND G. BLUM (*The Lancet*, July 14, 1945) describe the use of a new compound of urea and iodine, which they call U.F.I., in the treatment of septic wounds and burns. The compound consists of methylene diureide and dimethylene triureide with ionizable iodine and free urea in one crystalline salt, and it has a more potent antibacterial action than urea, than which it is no more toxic. It is active against *Bacillus proteus* and *Pseudomonas pyocyanea*. The addition of serum reduces its bacteriostatic action against most microbes, though not usually by as much as it reduces the bacteriostatic action of urea. The substance is applied locally as a powder and is painless on application.

Sulphadiazine.

J. G. REINHOLD, F. PHILLIPS AND H. F. FLIPPIN (*The American Journal of the Medical Sciences*, August, 1945) describe the results obtained by the oral administration of microcrystalline sulphadiazine (eshadiazine). It was found that when three grammes of this preparation were given there was a more rapid and higher concentration of sulphadiazine in the serum during the first six hours. Sucrose and flavouring agents did not affect the absorption. With a fasting stomach the rate of absorption was decreased, but still greater with microcrystalline than with ordinary sulphadiazine.

Inhalation of Penicillin Aerosol by Patients with Bronchial Asthma, Chronic Bronchitis, Bronchiectasis and Lung Abscess.

ALVAN L. BARACH *et alii* (*Annals of Internal Medicine*, April, 1945) aerosolized penicillin solution by the passage of five to eight litres of oxygen per minute through a nebulizer containing 1·0 millilitre of penicillin in concentrations between 20,000 and 100,000 units per millilitre. The predominating organisms found in the sputum culture were consistently absent twenty-four hours after discontinuance of treatment. The blood level of penicillin for one hour following inhalation of the aerosol was generally between 0·01 unit in 1·0 millilitre and 0·18. The aim of treatment, however, was not a high blood level, but a local application of penicillin on the bronchial wall. The twenty patients treated suffered from (*a*) varying combinations of bronchial asthma, bronchiectasis and pulmonary emphysema, (*b*) bronchiectasis with or without chronic lung abscess, (*c*) pulmonary fibrosis and emphysema, and (*d*) acute lung abscess. In five cases the improvement was marked, and seemed to be due to the inhalation of penicillin aerosol. In ten others improvement was moderate, and in the remaining five cases no significant clinical benefit was achieved. Of the fifteen patients whose condition was improved, seven suffered a recurrence of symptoms in two months or less. Further studies on the effect of penicillin aerosol are indicated in (*a*) bronchial asthma with bronchial infection, (*b*) bronchiectasis and (*c*) acute lung abscess. The results of experiments with white rats, weighing from 150 to 200 grammes each, which were injected with 0·1 millilitre of a rat culture of hæmolytic streptococcus and then either kept as controls or treated with penicillin by intramuscular injection or inhalations of penicillin aerosol, are given. Of 31 control animals all died, the average length of life after injection of 0·1 millilitre of hæmolytic streptococcal culture being 27 hours; of 28 rats given penicillin by injection, only four died, and these animals lived an average time of 117 hours after infection. In the third group of 31 rats given penicillin by inhalation 19 died, living an average time of 53 hours after infection. It is evident, therefore, that penicillin given by inhalation may protect rats against systemic hæmolytic streptococcus infection, but that, owing to obvious loss during its administration, the protection is less effective than a comparable dose injected intramuscularly.

Poliomyelitis.

N. S. RANSOHOFF (*The Journal of the American Medical Association*, September 8, 1945) has described the use of curare in the treatment of four children suffering from acute poliomyelitis. Nuchal rigidity and severe back spasm, as well as pain, were relieved by the injection of 0·9 milligramme of curare per kilogram. The effects were immediate and lasting in the relief of spasm and pain. A second dose was given the next day to one patient, a child, aged thirteen years. The ages of the other children treated were between two and a half and ten years. The author recommends the use of curare, of which he used a preparation called "Intocostrin" (Squibb).

The Treatment of Subacute Bacterial Endocarditis with Penicillin.

J. E. PAULIN AND C. J. MCLOUGHLIN (*Annals of Internal Medicine*, April, 1945) treated with penicillin six patients suffering from subacute bacterial endocarditis with three apparent cures. All patients seem to require at least 4,000,000 units of penicillin; the condition of all appeared to be hopeless at the onset of treatment. The authors contrast these figures with the 1% of patients who recover spontaneously and the 4·5% to 15% of cures obtained with various combinations of sulphonamide drugs.

NEUROLOGY AND PSYCHIATRY.

Headache following Injuries to the Head.

A. P. FRIEDMAN AND H. H. MERRITT (*The Journal of Nervous and Mental Disease*, July, 1945) have examined 265 patients with acute head injury and have correlated their findings with the occurrence of headaches during the patient's stay in hospital and for periods varying from two to twelve months after the injury. The authors found a cerebro-spinal fluid pressure of less than 160 millimetres in 56% of their cases, a pressure between 160 and 200 millimetres in 22%, between 200 and 250 millimetres in 17%, and over 250 millimetres in 5% of cases. The cerebro-spinal fluid was clear in

65% and bloody in 33% of cases. A marked correlation was proved between cerebro-spinal fluid abnormalities and the duration of coma and amnesia following the injury. The incidence of headache in the immediate post-traumatic period did not occur in a significantly higher percentage of patients with increased pressure and bloody fluid. The authors conclude that headaches persisting for several months after injury cannot be related directly to the cerebral pathology of brain injury as indicated by cerebro-spinal fluid.

Organic Deterioration.

HIRAIN K. JOHNSON AND RUDOLF LARSENER (*The Psychiatric Quarterly*, April, 1945) discuss the Worcester-Wells memory test in cases of organic deterioration. This test provides a variety of procedures for memory testing and is standardized for adult age groups; it thus allows for the fact that there is a normal loss of memory with increasing age. Of the symptoms displayed in the organic mental syndrome memory is the most amenable to exact testing. A number of elderly psychotics were found to possess normal memories, which fact, in the opinion of the authors, indicates that emotional and personality difficulties are paramount in the reaching of a decision whether a given individual can live outside an institution. In the application of the Worcester-Wells test a low score may indicate mental deficiency or melancholic retardation or other psychiatric conditions. Caution in the interpretation of results is thus called for; and only under proper test conditions with sustained and maximum attention can accurate results be obtained which may provide a rough quantitative index of the degree of mental impairment.

Neurotic Character Structure of the Alcoholic Personality.

DOMINIC A. BARBARA (*The Psychiatric Quarterly*, July, 1945) considers the aspect of the alcoholic problem which is concerned with alcoholism as an underlying neurotic character structure. The recent literature of the subject is passed under review; and two cases are presented in detail and with full discussion. In the first case it is found that alcohol offers the only means of finding a temporary solution to the patient's emotional conflicts, and at the same time gives him a means of fulfilling his masochistic tendencies in punishing him for his weak and irresponsible make-up. The author concludes that this use of alcohol, which at first serves as a means of escape, builds up all the more conflict and anxiety; and finally a complete dependence on alcohol is established.

Psychodynamics in Criminal Behaviour.

CRIME, according to David Abrahamsen (*The Journal of Nervous and Mental Disease*, July, 1945), is in a sense an artificial thing created by law. People act according to their inner strivings, and if these actions happen to be against the law they are regarded as criminal. Criminalistic tendencies are present in all human beings. There are differences in degree but not in type. Apparent gain is not always the real motive. A criminal act represents attempts of the personality to adapt itself to the prevailing situation. Thus, to a certain extent, each offender selects his own type of crime; and, generally, the crime chosen is typical of the person who commits it. Psychopathology realizes a need to suffer; and many crimes unconsciously motivated arise out of this need. This unresolved wish for punishment is expressed in all the faulty acts which the culprit performs after his actual crime. Murder sometimes represents disguised suicide. Certain offenders may be classified as psychosomatic. A psychosomatic disorder may arise from an inadequately solved conflict. In such a case one individual may respond with an antisocial act, while another will develop a peptic ulcer. Again palpable physical abnormality may cause crime. The writer thinks that if psychoanalysis could be utilized in a practical form—together with psychiatric social workers—it would be of inestimable value to those who need it. Not until this is realized can any far-sighted treatment be planned for criminal behaviour.

Psychogenesis in Delirium Tremens.

RALPH RESENBERG (*The Psychiatric Quarterly*, April, 1945) takes up the position that the symptomatology of *delirium tremens* is not the direct toxic result of alcohol. His studies, two of which he quotes in detail, would seem to him to indicate that *delirium tremens* consists of three syndromes; and that these seem to represent acute, subacute and chronic schizophrenic episodes. The first syndrome is of such duration that the hallucinations disappear before the patient recovers from the toxic effect of alcohol. In the second type the psychotic episode outlasts the toxic effects of alcohol: the hallucination reveals its true schizophrenic character. The illness becomes chronic in its third manifestation. At first the characteristic visual hallucinations are experienced, but later these are replaced by those of more typical schizophrenic type, and in due course mental deterioration sets in.

An Evaluation of the "Shock" Therapies.

A. E. BENNETT (*The Psychiatric Quarterly*, July, 1945), now that the initial enthusiasm has died down, seeks to make a critical evaluation of the well-known shock treatments in psychiatry. His figures show that patients suffering from *dementia præcox* treated with insulin were discharged from hospital at the rate of 79·5% as compared with 58·8% of untreated patients. Their stay in hospital was 3·8 months shorter than that of the untreated patients. A larger proportion of the insulin-treated patients turned to gainful employment. Metrazol ("Cardiazol") therapy has declined in popularity since electro-shock has proved in all ways more desirable. *Grand mal* seizures are essential for correct treatment. There is no dispute whatever as to the value of electric shock therapy in the affective psychoses. From 80% to 90% of patients recover. Good results can be expected in the presenile depressions. Generally speaking, patients with obsessive-compulsive states and those suffering from conversion hysteria do not respond well. Anxiety depression is a much more favourable condition. Finally the author discusses complications and hazards involved in the shock therapies.

Problems of the Senile and Arteriosclerotic Mental Patient.

NATHAM BEIKENSTEIN AND LEONARD GOLD (*The Psychiatric Quarterly*, July, 1945) have studied one hundred consecutive senile dements and an equal number of patients suffering from psychosis with cerebral arteriosclerosis. Figures regarding age and longevity are quoted. The major percentage of persons of both groups died within months of entering a mental hospital. The onset of the senile psychosis tended to be more insidious than that associated with arteriosclerotic infections; accidents and psychic traumata were the main precipitatory factors in the former, stroke, fracture and surgical operations in the latter. Of the cerebral arteriosclerotic patients, 16% lived for an average period of two and a half years after their initial psychotic manifestations.

Prefrontal Lobotomy.

WALTER FREEMAN AND JAMES W. WATTS (*The American Journal of Psychiatry*, May, 1945) report on fifty patients suffering from schizophrenia whom they treated by prefrontal lobotomy from two to seven years previously. They discuss the indications and contraindications of this treatment, comment on the signs of recovery, and devote some space to a discussion of the *modus operandi* of the treatment. Although they claim that prefrontal lobotomy is a procedure of last resort, they do not believe that the operation should be deferred until the patient has become emotionally deteriorated. They freely admit that schizophrenia does not respond so readily as other types of illness, such as the convulsive and obsessive conditions. It is their belief, however, that even the chronic hospital schizophrenic can be made to live more happily after lobotomy; for such an operation appears to bleach the affect attached to the ego and to turn the patient's interest away from himself towards the outside world.

ACCORDING to Josef A. Kindwall and David Cleveland (*The American Journal of Psychiatry*, May, 1945), prefrontal lobotomy is a drastic surgical attack upon human maladjustment. No patient is ever the same after such an operation. He is usually happier and more at ease. He is sometimes more productive than before. But generally speaking the underlying illness (schizophrenia) has been arrested and not eradicated. This report covers fifteen patients upon whom the operation was first performed in April, 1942, when they all seemed to possess a hopeless prognosis. All but four had previously received shock treatment. These authors list the surgical dangers of treatment as follows: (i) immediate or delayed hæmorrhage, (ii) visceral and thermo-regulatory disturbance, (iii) occurrence of post-operative pneumonia, especially in the aged, (iv) inhalation of unswallowed food, (v) possibly an infection. All patients showed varying degrees of improvement; one is gainfully employed and five others are living at home.

British Medical Association News.

SOUTH AUSTRALIAN BRANCH NEWS.

SHORTAGE OF HOSPITAL ACCOMMODATION IN SOUTH AUSTRALIA.

FOR some time past the Council of the South Australian Branch of the British Medical Association has felt considerable anxiety over the shortage of staffs for private hospitals, and in 1942, when the position had steadily become worse, the Council felt that unless immediate steps were taken to relieve it, very serious consequences would result to the civil population, more particularly to expectant mothers, many of whom were the wives of men serving with the armed forces.

The Council viewed with alarm the probable closing down of private hospitals, and, unfortunately, the fears expressed were well founded, as several have had to close down, causing considerable anxiety to those who had arranged accommodation in maternity cases, and to doctors who were consequently unable to get patients into hospitals for surgical and other treatment.

The manpower authorities were also approached regarding the extreme urgency of the need of securing female hospital employees.

On January 23, 1944, the Council wrote to the Chief Secretary of South Australia, drawing attention to the unsatisfactory position existing, and made constructive suggestions for his consideration. Although appreciative of the situation and anxious to help in the matter, the Chief Secretary replied that there were certain aspects beyond the control of the Government which prevented any additional assistance being given.

During 1945 a conference was held between the Council and matrons of principal private hospitals in the metropolitan area with a view to obtaining their opinions as to the best means of improving matters.

Following the eighth interim report of the Parliamentary Joint Committee on Social Security in which the regionalization of hospitals was recommended, the Council called a conference with representatives of the Municipal and Metropolitan Councils Association to put before them a plan for regionalization of hospitals to be financed by a hospital rate on the ratepayers in each district. The Chief Secretary, the Honourable A. L. McEwin, accepted an invitation to attend the meeting, and after a broad discussion on the subject, Mr. McEwin gave a *résumé* of the various schemes proposed by the Government, and informed the meeting that the amount of money involved in carrying out these schemes represented over £1,000,000. He said that all of the proposals mentioned were urgent, in view of the absence of any priority for building hospitals during the war, as was demonstrated by the time occupied in completing the new operating block at the Royal Adelaide Hospital. It was necessary, he said, that practical evidence by way of realization should be effective before any further commitments would be accepted seriously by the public. Other hospitals had sought his support to erect buildings which the Commonwealth Government had not seen fit to approve, and the Commonwealth Government was now apparently intent on making State governments responsible in this direction.

He mentioned that the position relating to manpower and material was still extremely difficult, and the latter was being further aggravated by industrial hold-ups in the eastern States, particularly in the coal and steel industry.

Mr. McEwin said that he could hold out no hope of a speedy termination of the present position, especially in view of the priority given to building houses, and in addition the present shortage of building materials created a position where there was no immediate possibility for the South Australian Government to make effective the entire plans mapped out. He could give an assurance, however, that the Government was serious in its endeavour to give the earliest practical effect to the proposals outlined earlier in his remarks. Whilst he was fully in sympathy with the principle of the district hospitals, he felt that nothing further could be done at the moment, and thought it would be at least two years before the present situation was in any way relieved.

At the request of Sir Henry Newland, Mr. McEwin stated that whilst he could not commit the Government, he could see no reason for not regarding the building of the hospital in the Western District, which has been approved by the Government, as part of a plan for regionalization of hospitals. Personally, he was in favour of this hospital as included in the general plan of regionalization.

The Council feels that the situation as regards obstetrics is now well nigh impossible. It is necessary for pregnant women to book their beds as soon as they become pregnant, and in many instances the only hospitals which take midwifery cases are already fully booked right to nine months ahead. The problem is now so bad that doctors tell their patients that they themselves must arrange for hospital accommodation.

From the above information it will be seen that the Council of the South Australian Branch of the British Medical Association has been in the past fully alive to the growing seriousness of the situation, and has done everything in its power to alter a position which has now developed into a very dangerous state.

NOTICE.

THE General Secretary of the Federal Council of the British Medical Association in Australia has announced that the following medical practitioner has been released from full-time duty with His Majesty's Forces and has resumed civil practice as from the date mentioned:

Dr. K. W. Starr, O.B.E., 185, Macquarie Street, Sydney (February 20, 1946).

THE Librarian of the Victorian Branch of the British Medical Association would be glad to learn of any reader of this journal who could spare a copy of the August, 1941, issue of *The Journal of Pediatrics*. This issue was never received at the library, and the publishers have informed the Librarian that it is out of print. Anyone who is able to comply with this request should communicate with the Librarian at Medical Society Hall, 426, Albert Street, East Melbourne, C.2, Victoria.

Special Correspondence.

NEW ZEALAND LETTER.

BY OUR SPECIAL CORRESPONDENT.

A Post-Graduate Chair in Obstetrics and Gynæcology.

THE establishment of a post-graduate chair in obstetrics and gynæcology, originally mooted by the New Zealand Obstetric and Gynæcological Society (under the ægis of the New Zealand Branch of the British Medical Association) in 1940, was carried a step further this week when the Senate of the University of New Zealand, meeting in Auckland, authorized the chair to be established at Auckland University College. A committee of Auckland business men have collected £55,000 (£100,000 is the objective) to endow the chair, which will be the first post-graduate chair in New Zealand. It is possible it may have some under-graduate teaching duties as well.

A strong advisory committee is to be set up to support the Council of Auckland University College and act as a liaison between it and the Faculty of Medicine at Otago University in Dunedin.

The project promises to make a move toward greater self-reliance on the part of the Dominion in the matter of post-graduate training, and is a necessary adjunct to maternity benefits under social security. Without it, there would be no visible means of raising standards of practice in that branch.

British Medical Association Branch Conference.

The first New Zealand Branch Conference to be held since 1939 was held in Auckland from February 12 to 15, 1946, under the Presidency of Mr. Eisdell Moore, F.R.C.S., of Auckland. Brilliant summer weather prevailed throughout, rendering fluid loss during the meetings excessive. Happily the balance was restored by an enjoyable series of social functions, including a civic reception by the Mayor, a musical evening, a garden party, a dinner and a ball.

The official visitor was Sir Stanton Hicks, of Adelaide, Professor of Physiology, and he led several discussions on subjects which included nutrition, penicillin and endocrinology. Full sectional meetings were also arranged covering a wide range of subjects from amputations to thyreotoxicosis and thiourea.

Generous time was set aside for the discussion of the medico-political situation by the full conference, and the Council remained in nigh perpetual session throughout. The Minister of Health, the Honourable A. H. Nordmeyer, had given an address at the civic reception, in which he traversed the situation in a clear and friendly manner, indicating the Government's inclination towards a salaried service, but without compulsion of either doctor or patient. He hoped the British Medical Association would agree to bury the "refund" system in favour of the now largely used "fee for service" system.

Long periods were given to the discussion of the future of medical practice in New Zealand, and a shorter one to group practice. No decisions were promulgated, this being the function of the Council. Very free expression of opinion took place, and a reasonableness of spirit amongst the diverse views was apparent. There was also a naturally greater realism in the general attitude in view of post-war conditions, returning service men, and the unsatisfactory state of contemporary practice. Decisions of Council go back to Divisions before final adoption.

Medical Practice.

MEDICAL PRACTITIONERS AND EVIDENCE AT INQUESTS.

THE following letter is published at the request of the Medical Secretary of the Victorian Branch of the British Medical Association.

[COPY.]

The Medical Secretary,
British Medical Association,
Albert Street,
East Melbourne.

Dear Sir,

At a recent meeting of the Council of the Medical Defence Association of Victoria a matter was brought up for consideration as to whether a medical man could be compelled to give evidence at an inquest.

The matter arose in this way: A baby was born in a country town and its body was found dead and partly burned in the incinerator of an hotel. A young woman who was residing at the hotel was questioned by the police, and on her denial that she had given birth to a baby, she was examined by a medical man, whose examination showed that she had quite recently given birth to a baby, but the medical man, at the request of the young woman, refused to give any information to the police as to the result of his examination.

The medical man concerned sought the advice of my Association as to whether he could be compelled to give evidence at the inquest on the baby's body, and on the matter being referred to the solicitor for the Association, he gave a considered opinion that the medical man could be compelled by the coroner to give evidence, but advised that he should plead privilege.

At the inquest held before a police magistrate the young woman was represented by a solicitor and the Crown was represented by a legal officer of the Crown Law Department, who, on the medical man claiming privilege, immediately produced authority to the effect that a claim of privilege by a medical man could not be maintained before a coroner.

The coroner thereupon refused to allow the claim of privilege and ordered the medical man to give evidence, which he did.

My Council directed that notification of this matter should be sent to the British Medical Association for the information of members.

Yours faithfully,

F. R. PRIESTLY.

Medical Defence Association of Victoria,
Kelvin Hall,
55, Collins, Street,
Melbourne.
January 29, 1946.

Correspondence.

THE SPELLING OF WORDS.

SIR: Many of the words used in medical parlance are descriptive and etymologically accurate. There is no reason for misspelling such words. I refer in particular to the word hydrocele. Many junior members of the profession and even the record room of one large Sydney hospital now spell this as hydrocoele. The Greek kēlē means a tumour, koilos means a hollow.

Yours, etc.,

DAVID MONK ADAMS.

Sydney Hospital,
Macquarie Street,
Sydney.
February 9, 1946.

WOUNDS CAUSED BY SMALL FISH.

SIR: Recently I attended some cases of wounds of the foot caused by treading on small fish, presumably bullrouts, one being of some interest.

A lad, aged fourteen, trod upon a bullrout three hours before, and immediately suffered severe pain. In the three hours the pain rose to a climax and then subsided to a dull throb which did not worry the patient. There was some soreness in the groin. On examination, there were two puncture wounds in the middle of the ball of the left foot, one three-sixteenths of an inch long and the other one-sixteenth of an inch in diameter. There was no bleeding or inflammation, but the whole foot was swollen with pitting œdema extending into the ankle region. The left inguinal lymph glands were enlarged and tender. As the pain had subsided, no injection of local anæsthetic was given, and treatment consisted of local cleansing with a mercurochrome 1% dressing, postural rest, a short course of sulphadiazine and 1,000 units of anti-tetanus serum, as he had walked home barefooted. Recovery was uneventful over twenty-four hours.

Other cases indicated that the duration of troublesome pain is from two and a half to three hours, so any results of the alleviation of pain by various methods should be examined with this fact in mind. An interesting feature was the early involvement of the inguinal lymph glands such a distance from the lesion.

Yours, etc.,

KEITH F. D. SWEETMAN.

c.o. 57, New South Head Road,
Vaucluse,
New South Wales.
February 10, 1946.

THE TREATMENT OF INGUINAL HERNIA.

SIR: In an article on inguinal hernia in your issue of February 9, 1946, Dr. Franklyn V. Stonham indicates that he practises the Hamilton Russell operation in favourable cases. At the present moment the Launceston General Hospital is conducting an inquiry into the sites of recurrence after various kinds of primary operations. If any of Dr. Stonham's cases have recurred we would be most grateful if he would state the exact site or sites of the recurrences. It has been our experience at this hospital, where the Hamilton Russell operation has been standard since 1926, that there is only one kind of recurrence which follows it and that is one which is at the site of the original sac. It may be said here that our inquiry has been greatly hampered by the fact that many surgeons reporting series of recurrences have failed to differentiate between recurrences at the site of direct and of indirect herniæ. The importance of this differentiation becomes plain when it is realized that adherents of the Hamilton Russell procedure claim that recurrences at the site of direct herniæ are not true recurrences at all, but are new and separate herniæ created by the operation performed to cure the first one. They claim, for instance, that if the recurrence rate after the Hamilton Russell operation is, say, x%, the recurrence rate after plastic operation such as Bassini's is x% + y%, where "x" represents the percentage of indirect recurrences and "y" the percentage of direct "recurrences".

It is very refreshing to see that Dr. Stonham gives Hamilton Russell his proper place in the field of hernia

surgery. Articles have appeared recently which purport to give a history of the hernia operations and Hamilton Russell's name has not been mentioned at all. Students of the literature will perhaps say that there are only two outstanding figures in the history of the surgery of hernia—one, Bassini, and the other Hamilton Russell. Curiously enough, Hamilton Russell spent a great part of his life in condemning the Bassini operation. Those of us who are his disciples will agree with him, but nevertheless one wonders whether Hamilton Russell was really fair to Bassini. In the first place it must be realized that Bassini not only described the method of suturing the conjoined tendon *et cetera* to Poupart's ligament, but, what is of much greater importance, that he was one of the first to advocate boldly opening the external oblique and completely removing the sac. In the second place, it must be remembered that whereas Hamilton Russell was a surgeon to a children's hospital and so was operating only on easy cases, Bassini was operating on adults at a time when cases did not present themselves until the herniæ had become huge. It is very probable, if a modern surgeon were handling the 262 cases reported by Bassini, that in the majority of them he would perform an extensive plastic repair. It is quite probable also that in Bassini's own hands his own operation was as good a plastic procedure as any which has been devised since. It must be pointed out, however, that we live in very different surgical times from those of Bassini, and that the majority of hernia cases now present themselves at a stage of development when it should be possible to deal with them by relatively simple procedures. What Hamilton Russell really objected to was not that Bassini should have developed a particular operation to meet a particular state of affairs, but that an operation designed to close an opening that occupied most of the canal should be applied with all its accompanying risks to the closing of an opening occupying only a small part of the canal.

Yours, etc.,
C. CRAIG, M.D., M.S., F.R.A.C.S.,
Surgeon-Superintendent.

General Hospital,
Launceston,
February 13, 1946.

THE INTERVERTEBRAL DISK.

SIR: I regret that Dr. Marion Radcliffe-Taylor has been caused the confusion which is apt to occur with partial reading and quotation.

There is no contradiction between 1: "No one can doubt the good effects of conservative surgery on the intractable sciatica due to mechanical pressure from a disk fragment or protrusion, where localization can be accurate", and 2: "Localization by observation of pain, numbness, and objective signs referred to a dermatome might be deceptive; the lesion might not be on the vertebral level at which one expected to find it, as there could be an associated prefixation or post-fixation of the plexus. It was, however, a simple enough matter to make an interlaminar exploration of two spaces if desired."

The first quotation is merely a general statement which the second amplifies.

Yours, etc.,
DOUGLAS MILLER.

Craignish,
185, Macquarie Street,
Sydney.
February 22, 1946.

"BEACH FOOT."

SIR: It has been stated that those who have never worn boots do not suffer from what is commonly known as "beach foot", "athlete's foot" *et cetera*.

Presuming that this was due to absence of moisture between the toes, and having been a sufferer myself from this fungous infection, I thought it worth while to concentrate on this desiccation effect, with resultant unsuitability of soil, rather than on direct fungicides. I had previously tried every kind of lotion, powder and remedy, proprietary and otherwise, some giving temporary relief or apparent cure, to be followed by relapse. All I did was to draw a strip of bandage wet with methylated spirit between the toes and applied to outlying areas, hoping for a slight depth of hygroscopic effect, followed by another strip wet with petrol for its very efficient surface drying about three times a day for a week, then once or twice a week for a month. This gave complete cure, and I have had no further trouble. I got two friends to try it and it cured both quickly. In one the trouble had been present only a few weeks and in a severe form, so here improvement through "the soil being eventually worked out" did not apply. I realize that the number of cases is too few for absolute certainty, but the remedy is so easily tried that I report it for what it is worth and would be glad of a personal line from anyone who tries it and finds it ineffective.

Possibly absolute alcohol would be more effective than methylated spirit, but the latter is more easily obtainable and served the purpose.

Also, can anyone tell me whether there is much antiseptic power in petrol? On account of its limpidity and absence of coagulation effect, I imagine it would be more penetrating in deep punctures from thorns, nails and splinters than most spirituous lotions, tincture of iodine *et cetera*. I have used it for years on myself for these injuries, cuts and so on, and have never had further trouble. Also it has the advantage of being painless.

Yours, etc.,
ERIC POCKLEY.

Avalon Beach,
New South Wales,
February 13, 1946.

AUSTRALIA AND SCIENCE: THE UNIVERSITY OF SYDNEY AND SCIENTISTS.

SIR: In referring to your leading article in the journal dated February 23, 1946, I am concerned mainly with one remark, whose substance, I believe, offers, in part at least, an explanation of some of the difficulties which beset our universities.

Too little attention is given by the community at large and by the appropriate authorities in particular to consideration of what a university is, or should be, and of what the function of a university is, or should be. As you say, it is quite simple to allow universities to degenerate to the level of technical schools—in fact, so simple that many universities, including that of Sydney, have already, by whittling away their birthright to education and culture for a mess of government pottage, sunk even lower, in so far as they (perhaps unconsciously) masquerade as universities when in reality they are little more than collections of vocational training schools.

But any suggestion which might be read into your article that a lecturer in, say, bacteriology or applied chemistry should be paid more than one in, say, Greek or philosophy, is not likely to do otherwise than aggravate the present position. I would reverse things, and for as long as, say, bacteriology or applied chemistry remains only a curriculum subject for professional schools or careers, pay the lecturers in such subjects less, not more, than the lecturers in, say, Greek or philosophy. In this way it may be possible at least to begin to put the emphasis on education and on learning as contrasted with merely technical training in vocational schools. Professional schools have no rightful place in a true university—and here let it be made clear that a department or school of chemistry, or zoology, or anatomy, or any other subject is not to be confused with a medical school wherein such subjects are in general taught just so much or so little as is arbitrarily agreed to be necessary for training medical practitioners. It is the intention and the goal which matter, not the subject studied. If the goal be knowledge for its own sake, then that discipline is permissible within a university; if the goal be merely professional efficiency, then it is not permissible. By all means let us study botany, Greek, physiology, mathematics *et cetera*, but not solely because a modicum of knowledge of one or more of these subjects has been pronounced a necessary part of a curriculum in veterinary science, medicine, engineering *et cetera*.

If, as President Hutchins, of the University of Chicago, says, the general educational system of a country is a true indication of the ideals of that country, then it is high time we took stock of both our ideals and our systems in Australia, remembering that our universities are closely bound up with those systems. Vocational training, even though undergone within a recognized university, cannot replace education; in the former the emphasis is continually on ability to engage successfully in some gainful occupation, whereas in the latter the intellectual is paramount and

material gain is excluded as an objective, but not necessarily as a consequence.

A possible increase in the already excessive number of professional groups within the university makes it imperative to think and to act at once, if we hope or wish to avert the disappearance of education at the tertiary level.

Yours, etc.,

N. E. GOLDSWORTHY.

Roseville,
New South Wales,
February 27, 1946.

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 34, of February 21, 1946.

NAVAL FORCES OF THE COMMONWEALTH.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Transfer to Retired List.—Surgeon Captain Leonard Darby, C.B.E., is transferred to the Retired List, dated 24th January, 1946.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Termination of Appointment.—The appointment of John Matthias Joseph Jens as Surgeon Lieutenant-Commander is terminated, dated 30th November, 1945.

AUSTRALIAN MILITARY FORCES.

Australian Army Medical Corps.

V145875 (now VX104315) Captain L. B. Witts is transferred from Australian Army Medical Corps (Medical), 3rd Military District, 30th April, 1942 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 259 of 1943, promulgated in *Commonwealth Gazette*, No 184A, of 1943).

The name of TX2157 Lieutenant-Colonel B. M. Carruthers, O.B.E., is as now shown and not as it appeared in Executive Minute, No. 162, of 1945, promulgated in *Commonwealth Gazette*, No. 227A, of 1945.

3rd Military District.—The provisional appointment of V145875 Captain L. B. Witts is confirmed, and he is transferred to Australian Army Medical Corps (Medical), 30th April, 1942.

NX108462 Lieutenant-Colonel S. D. Meares relinquishes command of 7th Australian Field Ambulance and is appointed to command 103th Australian Convalescent Depot, 11th December, 1945.

NX102477 Lieutenant-Colonel K. A. McGarrity relinquishes command of 2nd/1st Australian Field Ambulance, 18th December, 1945.

SX2817 Lieutenant-Colonel (Temporary Colonel) H. M. Fisher relinquishes command of 2nd/6th Australian General Hospital and is placed upon the Regimental Supernumerary List, 11th December, 1945.

TX2142 Lieutenant-Colonel M. G. Edison relinquishes command of 109th Australian Casualty Clearing Station (Australian Imperial Force) and is placed upon the Regimental Supernumerary List, 11th December, 1945.

NX115447 Lieutenant-Colonel J. Davis relinquishes command of 103rd Australian Convalescent Depot and is placed upon the Regimental Supernumerary List, 11th December, 1945.

QX6083 Lieutenant-Colonel J. J. Ryan, M.C., relinquishes command of 11th Australian Field Ambulance and is placed upon the Regimental Supernumerary List, 11th December, 1945.

SX11527 Major (Temporary Lieutenant-Colonel) W. A. Russell relinquishes command of 8th Australian Field Ambulance (Australian Imperial Force) and is placed upon the Regimental Supernumerary List, 11th December, 1945.

VB127209 Local Major D. Sinclair ceases to be seconded for duty with the Chemical Defence Board as Deputy Chief Superintendent, Australian Field Experimental Station, relinquishes the rank of Local Major and ceases to be attached to the Australian Military Forces, 24th October, 1945.

The following officers are placed upon the Regimental Supernumerary List: Captains VX94813 P. E. Dane, 3rd December, 1945, and VX90842 F. A. L. Bacon, 12th December, 1945; XV48607 Major (Temporary Lieutenant-Colonel) T. C. Backhouse, and Lieutenant-Colonels QX6481 R. G. Quinn, NX34914 F. W. Niesche, SX2816 J. M. Bonnin, and WX1524 R. W. Johnson, 11th December, 1945, NX70154 L. S. Loewenthal, 14th December, 1945, SX2912 A. H. Lendon, 11th December, 1945, NX18 I. M. Mackerras and NX35025 E. F. Thomson, 14th December, 1945, and SX21585 T. A. B. Jones, SX14109 A. C. McEachern, XV14854 C. A. M. Renou, WX1525 N. H. Robinson, NX70331 N. R. Wyndham, SX1471 N. P. Wilson and VX315 L. G. Travers, 31st December, 1945.

V159887 Lieutenant-Colonel (Temporary Colonel) C. W. Ross relinquishes the rank of Temporary Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps) with the rank of Lieutenant-Colonel and is granted the rank of Honorary Colonel, 10th November, 1945.

VX39480 Lieutenant-Colonel (Temporary Colonel) E. T. T. Downie relinquishes the rank of Temporary Colonel and is transferred to the Reserve of Officers (Australian Army Medical Corps) with the rank of Lieutenant-Colonel and is granted the rank of Honorary Colonel, 13th December, 1945.

NX19 Lieutenant-Colonel K. B. Armstrong is transferred to the Reserve of Officers (Australian Army Medical Corps), 4th December, 1945.

To Be Lieutenant-Colonels.—Majors (Temporary Lieutenant-Colonels) NX19 K. B. Armstrong, NX70154 L. S. Loewenthal, QX6083 J. J. Ryan, M.C., and SX1471 N. P. Wilson, 27th September, 1945, and VX315 L. G. Travers, 22nd July, 1945.

No. 102 (Holland Park) Military Hospital.—NX171725 Captain W. S. Hemphill is placed upon the Regimental Supernumerary List, 9th October, 1945.

No. 105 (Adelaide) Military Hospital.—SX34386 Captain J. A. Lewis is transferred from Australian Army Medical Corps (Medical) Reinforcements with regimental seniority as from date of transfer, 24th November, 1945.

2nd/12th Australian Field Ambulance.—WX33063 Captain L. G. Redgrave is placed upon the Regimental Supernumerary List, 19th December, 1945.

Reserve Citizen Military Forces.

Australian Army Medical Corps.

New South Wales Lines of Communication Area.—The rank of Colonel A. H. Tebbutt, D.S.O., V.D., is as now shown and not as it appeared in Executive Minute, No. 77, of 1945, promulgated in *Commonwealth Gazette*, No. 124A, of 1945.

Reserve of Officers.

The undermentioned officers are transferred to the Reserve of Officers with effect from the dates shown and, where applicable, cease to be seconded on the date prior to such transfer:

VX114197 Major J. D. Hicks, 30th October, 1945.

No. 114 (Goulburn) Military Hospital.—QX6253 Major R. J. Hoy, 30th November, 1945.

15th Australian Field Ambulance (Australian Imperial Force).—SX15736 Captain L. S. Wallman, 9th November, 1945.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Gates, Bruce Fonyth, M.B., B.S., 1937 (Univ. Sydney), (NX169487, Captain), 2, Ozone Street, Cronulla.

McNeil, Angus, M.B., B.S., 1941 (Univ. Sydney), 44, Plowman Street, North Bondi.

Rowe, Denis Patrick, M.B., B.S., 1936 (Univ. Sydney), 8, Redan Street, Mosman.

Musso, Fedele John Andrew Leo, M.B., B.S., 1945 (Univ. Sydney), 409, Forest Road, Penshurst.

Watson, Charles Rolleston, M.B., B.S., 1942 (Univ. Sydney), 11A, Silex Road, Mosman.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Andersen, Neville Arthur, M.B., B.S., 1945 (Univ. Sydney), District Hospital, Marrickville.

Bracken, Derek Christopher Gordon, M.B., B.S., 1940 (Univ. Sydney), 81, Darling Point Road, Edgecliff.

Clifford, Kevin Patrick, M.B., 1940 (Univ. Sydney), 57, Belmore Road, Randwick.
Colman, Jack, M.B., B.S., 1943 (Univ. Sydney), 81, Preddy's Road, Bexley.
Doctor, Benno Basil, M.B., B.S., 1945 (Univ. Sydney), 740, New South Head Road, Rose Bay.
Duval, Ferdinand, M.B., B.S., 1937 (Univ. Sydney), D.M.R., 1944 (London), 135, Macquarie Street, Sydney.
Evans, Cyril Percival Victorious, M.B., B.S., 1943 (Univ. Sydney), 8, Andrew Street, West Ryde.
Fisher, Gerard Maxwell, M.B., B.S., 1942 (Univ. Sydney), (Captain), Broughton House, Thomas Street, Parramatta.
Harker, Andrew Jennings, M.B., B.S., 1939 (Univ. Sydney), 7, Rawson Street, Epping.
Hemphill, Woodrow Sanford, M.B., B.S., 1942 (Univ. Sydney), (Captain), 38, Elizabeth Street, Mayfield, Newcastle.

Post-Graduate Work.

A FILM AFTERNOON AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine announces that arrangements have been made for the holding of a film afternoon at the Stawell Hall, 143, Macquarie Street, Sydney, on Wednesday, March 13, 1946, at 4.15 o'clock p.m., when the following medical films will be shown: "Beriberi", "Thiamin Chloride Deficiency". This film programme constitutes part of the annual general course conducted by the committee, and members of the allied and defence forces are cordially invited to attend.

Corrigendum.

IN the paper by E. R. Trethewie entitled "Anticoagulant Effect of Perfusing Organs: Liver, Kidney and Lung", published in the issue of September 15, 1945, an error has occurred in Table VI. In the heading of the third column the word "gramme" should read "milligrammes per ml".

A MEMORIAL TO THE LATE PROFESSOR JAMES THOMAS WATSON.

AN appeal is being made by the University of Sydney Medical Society for funds to establish a memorial to the late Professor James Thomas Wilson. The society suggests that the memorial be an annual prize in anatomy open to students in medicine. Contributions may be sent to Mr. I. J. Hunter at the Old Medical School; cheques should be made payable to the "Wilson Memorial Fund". Mr. W. A. Selle, Professor A. N. Burkitt and Mr. I. J. Hunter are trustees of the fund.

Medical Appointments.

Dr. J. M. Dwyer has been appointed first medical officer and Dr. R. A. Isenstein second medical officer in the male section of the night clinic at the Royal Adelaide Hospital, Adelaide.

Dr. G. W. Barker, Dr. H. B. Gill, Dr. A. N. Kingsbury, Dr. D. M. McWhae and Dr. D. D. Paton have been appointed to the Medical Board of Western Australia under the provisions of the *Medical Act*, 1894-1945.

Dr. A. B. Lilley, Chairman of the Hospitals Commission of New South Wales, has been appointed a trustee of the King George V and Queen Mary Maternal and Infant Welfare Foundation.

Dr. A. H. Joyce and Dr. T. A'B. Travers have been appointed members of the Opticians Registration Board under section 4 (*b*) (iii) of the *Opticians Registration Act*, 1935, of Victoria.

Dr. J. W. Rollison has been appointed medical superintendent of the Royal Adelaide Hospital, Adelaide.

Diary for the Month.

MARCH 12.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
MARCH 12.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MARCH 19.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MARCH 19.—New South Wales Branch, B.M.A.: Ethics Committee.
MARCH 20.—Western Australian Branch, B.M.A.: General Meeting.
MARCH 21.—Victorian Branch, B.M.A.: Executive Meeting.
MARCH 21.—South Australian Branch, B.M.A.: Council Meeting.
MARCH 22.—Queensland Branch, B.M.A.: Council Meeting.
MARCH 26.—New South Wales Branch, B.M.A.: Council Quarterly.
MARCH 27.—Victorian Branch, B.M.A.: Council Meeting.
MARCH 28.—New South Wales Branch, B.M.A.: Annual Meeting.
APRIL 2.—New South Wales Branch, B.M.A.: Council.
APRIL 3.—Western Australian Branch, B.M.A.: Council Meeting.
APRIL 3.—Victorian Branch, B.M.A.: Branch Meeting.
APRIL 4.—South Australian Branch, B.M.A.: Council Meeting.
APRIL 5.—Queensland Branch, B.M.A.: Branch Meeting.
APRIL 9.—Tasmanian Branch, B.M.A.: Ordinary Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

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